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Smoking-Cough, Vaccination in Relation with Socio-Economic, Working-Living Conditions among Garment Workers

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Abstract - This study attempted to calculate prevalence as well as to identify the patterns of smoking, cough and vaccination (BCG) coverage among garment workers in Dhaka city, Bangladesh. In this study 5829 garment workers from 12 garment factories were interviewed with a pretested questionnaire. The results revealed that 7.3%, 12.3% and 59.6% of garment workers respectively smoked cigarette, had cough and took BCG vaccination. Smoking was significantly associated with age and gender, whereas cough was significantly associated with education (>10 years education) and monthly salary and in case of vaccination, a significant relationship was seen with age, education, monthly salary (4001 BDT), room size (6001-800 and 8001 sq. ft.), status of light and air in the working room, sitting arrangement, number of persons living in a room (5-6 persons), length of living room (9 ft.) and width of living room (5-7 and 8 ft.). In case of BCG vaccination the significant associations appeared with age (25-34 and 35 years), education (6-10 years) and amount of Salary (4001 BDT). TB burden could be reduced significantly by considering the above mentioned factors.

Keywords : *smoking-cough, BCG vaccination, garment workers, living-environment.*

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Smoking-Cough, Vaccination in Relation with Socio-Economic, Working-Living Conditions among Garment Workers

Begum, Housne [α], Rashid, Mamunar [σ], Flora, Meerjady [ρ] & Sayem, Amir Mohammad [ω]

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I. Introduction

Developing countries have reported a more rapid rise in the prevalence of tobacco consu-mption among the youth than developed countries.[1,2] Researchers have investigated such multi-factorial phenomenon revealing various individual and environmental correlates of youth tobacco use onset. These variables have included age, gender, ethnicity, race, family structure, attachment to family and friends, personal and parental socio-economic status, school factors, lifestyle, stress, self-esteem and other personality characteristics, knowledge and attitudes, and parental and peer smoking.[3-7] Smoking is considered a major preventable cause of morbidity and mortality, causing over four million deaths a year.[8] This figure may increase to 10 million deaths per annum by 2030; 70% of which will be in the developing countries.[9] Cough is a symptom that affects a large proportion of the general population[10] and can cause a deterioration of an affected subject's quality of life. Cough is a common symptom in various respiratory disorders, such as asthma, chronic bronchitis and bronchiectasis.[11] Immunization remains one of the most important public health interventions and a cost effective strategy to reduce both the morbidity and mortality associated with infectious diseases. The uptake of vaccination services is dependent not only on provision of these services but also on other factors including knowledge and attitude of mothers,[12,13] density of health workers,[14] accessibility to vaccination clinics and availability of safe needles and syringes.

II. Garment Workers' Situation: Bangladesh Perspectives

The readymade garment (RMG) industry in Bangladesh has been expanding rapidly since the late 1970, accounting for about 76% of the country's total export earnings in 1999, making Bangladesh one of the 12 largest apparel exporters in the world[15] and by 2006 providing jobs for 4.5 million people, 80% of whom are women.[16]

Despite such encouraging role of RMG sector in Bangladesh, the worker's life is still one the poorest in this country.[17] Many of these workers have no access to the existing healthcare system due to their long working hours and financial constraints. Not surprisingly, the productivity of the Bangladeshi garment work force is low even by South Asian standards.[18] Around nine-tenths of the workers go through an illness or disease such as headache, anemia, fever, chest, stomach, eye and ear pain, cough and fever, diarrhea, dysentery, urinary tract infections and reproductive health problems. Safe conditions in the garment industry are very crucial for the worker's health and productivity.[19] However, this area is largely unexplored as there are very few studies in this regard in Bangladesh.[20] Under these circumstances, this study focused on the prevalence as well as associated factors of smoking, cough and BCG vaccination coverage among garment workers in Bangladesh.

III. Methodology

a) Participants

This study was carried out among 5829 garment workers in Dhaka city where 90% of the

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factories exist. The researchers used cross sectional study design to conduct the study. The participants were from 12 selected garment factories. As the reported prevalence of TB (pulmonary tuberculosis) in this high risk group was 9.6 per 1000[21] with 95% confidence interval the estimated sample size was calculated from:

$$n = 1.96^2 Xpq/d^2$$

(Here, p=9.6 per 1000; q=990.4 per 1000; d (relative precision) = 12% of current prevalence. So, estimated sample size was 2762). Further considering a 10% non-response with a design effect (taken at an approximate of 2), the final sample size was 5829.

b) Procedure

Cluster sampling technique was employed for selection of the study sample. Considering the large sample size, factories having more than 500 workers were enlisted from the BGMEA (Bangladesh Garments Manufacturing Association). Each factory was considered as a cluster. From the selected clusters, workers willing to participate in the study were included. Data collection was carried out during the first half of 2009. Six trained female interviewers collected the data through face to face interviews with a pre-tested questionnaire. Pre-test of the questionnaire was carried out in five garment workers. Each of the five workers was separately interviewed with the draft questionnaire. The questionnaire was finalized incorporating the feedback from the pre-test. Written informed consent from the participants as well as permission from the garment authority was taken before carrying out the interview.

c) Study variables

This study used three dependent variables, i.e., cigarette smoking, cough and BCG vaccination. Each of these three variables was measured with two categories (0=no and 1=yes). To calculate the prevalence of cough, disease history was taken by standard guide lines[22]. Chest X-ray and sputum for AFB were done in those having a history of cough for more than 21 days. Several independent variables were categorized under three headings viz. socio-economic, working environment and living conditions. Participants' socio-economic variables included age (initially collected as reported and later grouped as≤24, 25 -34 and ≥35 years), gender (0=male and 1=female), education (later grouped as 0=no education, 1=1-5 years, 2=6-10 years and 3=>10 years of education), marital status (0=unmarried, 1=married and 2=divorced/ widowed/ others), job (initially open ended but later categorized as 0=sewing, 1=quality and 2=others) and salary (later categorized as 0= ≤2000, 1=2 001-4000 and 2= ≥4001 BDT).

The variables within working environment included room size (later categorized as 0= ≤4000, 1=4001-6000, 2=6001-8000 and 3= ≥8001 sq. ft.), number of persons working in a room (categorized as 0= ≤100, 1=101 -200, 2=201-300 and 3= ≥301), status of light-air in the working room (0=sufficient and 1=not sufficient) and sitting arrangement (0=sufficient and 1=insufficient). The variables within living environment consisted of living place (0=slum and 1=not slum), number of persons in living room (later categorized as 0= ≤2, 1=3 -4, 2=5-6 and 3=≥8 persons), length of living room (later categorized as 0= ≤6, 1=7-8 and 2= ≥9 ft.) and width of living room (later categorized as 0= ≤4, 1=5-7 and 2= ≥8 ft.).

d) Data Analysis

Data analyses were carried out in two stages: data was initially analyzed for distribution the frequency of background characteristics, working and living condition of the garment workers. In the second stage, data were analyzed to identify the differentiating patterns of smoking, cough and BCG vaccination coverage among garment workers. For this, multivariate logistic regression analyses were carried out for each of the dependent variables.

IV. Results

a) Background characteristics

Out of 5829 garment workers, the under aged participants found was small 1.3% (not shown). The majority of the participants (54.6%) were ≤24 years of age while 26.1% were 25-34 years and 6.9% participants were ≥35 years of age (Table 1). Around two thirds of the participants (61.4%) were females, whereas 38.6% were males. Although more than 85% of the garment workers had some years of schooling, 82.2% had 1-10 years of schooling (34.1% had 1-5 years and 48.1% had 6-10 years), and only 4.8% had >10 years education. Around half (49.5%) were married. Most of the participants were working in the sewing section (71.3% 71.8%), while 14.6% and 14.1% 12.7% participants were working in quality and 'other' section respectively. The salary of garment workers varied from less than 2000 to more than 8000 BDT (1USD = 73 BDT) where around one third participants (31.6%) earned only <=2000 BDT, two-thirds (63.7%) earned 2001-4000 BDT and only 4.8% earned ≥4001 BDT per month as salary.

b) Working Environment

The mean room size was 6823 (SD=1610.5) sq. ft. About half (47.1%) and 20.2% of participants were working within 6001-8000 and ≥8001 sq. ft. room respectively (Table 2). Around one seventh participants were working in room accommodated for ≤100 workers. Whereas 19.9% and 33.6% of participants were working in a room accommodated for respectively 201-300 and ≤301 workers. About 35% workers worked with insufficient light and air. The sitting arrangement was insufficient for 48.8% 48.7% participants.

c) Living Environment

Only 13.6% of participants resided in the slum areas while more than four-fifths of the participants (86.4%) resided in other places (Table 3). Just over one fifth participants were living in a room with ≤2 persons. Although the majority of the participants (51.2%) were living in a room with a number of 3-4 persons, 3.5% of participants were also found living with 7-8 persons in a single room. More than one-third of the participants had ≤6 feet length of living room while more than two thirds of the participants lived in a 5-7 feet width room.

d) Prevalence and associations of cigarette smoking

In this study 7.3% of the garment workers were cigarette smokers (not shown). Multivariate logistic regression analyses were done to find out associations of smoking. It appeared that garment workers aged 25-34 and ≤35 years were less likely to smoke c ompared to garment workers aged ≤24 years but significant relationship appeared with age 25-34 years (OR=0.576, p<0.01) (Table 4). Significantly, male participants were more likely to smoke (OR=24.465) compared to female counterparts. Garment workers with some years of education (1-5, 6-10 and >10 years education) were more likely to smoke but the result was not statistically significant. Although results were not significant, married and divorced/separated/others participants were more likely to smoke compared to unmarried workers. Workers working in quality section and 'other' sections were more likely to smoke compared to workers in the sewing section. Participants' salary was not significantly associated with smoking.

e) Prevalence and associations of cough

This study identified 12.3% of garment workers had cough (not shown). The odds ratio (Table 4) indicated that although age, gender, marital status and job status had no significant impact on cough but workers with >10 years education had significantly lower likelihood of cough (OR=0.594, p<0.05) compared to that of workers with no education. Workers with the salary of ≤4001 BDT per month were significantly more likely to report cough (OR=1.209, p<0.05); however, it did not appear significant at p=0.02.

Multi-variate logistic regression was also carried out with the working environment to examine the impact on cough (Table 5). It appeared that room size of the factory had significant impact on garment workers' cough, i.e., participants working in a room with 6001-8000 and≤8001 square feet room we re respectively 1.978 and 1.643 times more likely to report cough compared to those working in a ≤4000 square feet room size. Although more than 100 persons living in a room (101-200 and ≥301 persons) appeared to have lower odds except 201-300 persons living in a room, the results were not statistically significant. Insufficient status of light-air in working room and insufficient status of sitting arrangement had significant impact on cough (OR=0.630, p<0.01 and OR=0.781, p<0.05 respectively) compared to the respective reference category.

This study further examined the impact of living environment on garment workers' cough (Table 6). It appeared that participants living in non-slum areas were more likely to have cough (OR=1.070, p>0.05) compared to participants living in slum areas but the result was not statistically significant. Significant relationship appeared in case of 5-6 persons living in a room (OR=0.593, p<0.05). Higher length of living room (7-8 and ≥9 square feet) appeared to have higher odds compared to lower length of living room (≤6 square feet). However, significant relationship appeared with the length of ≥9 square feet (OR=1.926, p<0.001). Contrary to it, lower width living had lower odds in having cough. It appeared that participants living in a room with 5-7 and ≥8 square feet were significantly less likely to have cough compared to that of ≤4 square feet.

f) Prevalence and associations of BCG vaccination

This study identified that 59.6% of the garment workers were vaccinated with BCG (not shown). Multivariate logistic regression analyses (Table 4) found that workers aged 25-34 and ≤35 years were more likely to take BCG vaccine (OR=3.812, p<0.001 and OR=5.265, p<0.001 respectively) compared to workers who were≤24 y ears of age. Although workers' gender, marital status and job status had no significant impact on getting BCG vaccination, education and salary appeared to have a significant impact on it. Workers with 6-10 years of education were 1.409 (p<0.05) times more likely to take BCG compared to workers with no education; however, it did not appear significant at p=0.02. Workers While workers with monthly income of ≥4001 BDT were less likely to take BCG vaccination (OR=0.741, p<0.001) compared to those with a monthly income of ≤2000 BDT.

V. Discussion

This study identified the levels and patterns of smoking, cough and BCG vaccination coverage among garment workers in Dhaka city of Bangladesh. To identify the risk factors, socio-economic, working and living conditions were taken into consideration. This study revealed that >7% of the participants smoked cigarette. Although tobacco is perceived as being cheap, its actual cost, compared with food, education, and health care, is quite high, excessively so for those for whom basic survival is a daily struggle. Another study also indicates that tobacco is most commonly used by those who can least afford it.[23] The amount spent by the average male cigarette smoker in 1997 would purchase 2,942 calories of rice per day-enough to make a difference between family members getting by or suffering from malnutrition. This is also

true for the Bangladeshi garment workers as they earn a meager amount of money that incapacitates them to run the family well. This study further revealed a high prevalence of cough (12.3%) with low vaccination coverage (59.6%) among the garment workers.

This study found that participants' age had negative impact on smoking. This is similar to other studies.[7,24-27] Numerous studies indicate that both in developed and developing countries the prevalence of smoking is increasing in youths and this is more rapid in the developing than the developed countries.[1,2] This study also revealed that garment workers with higher age were more likely to take BCG vaccination and male garment workers were more likely to smoke compared to female workers. Another study also revealed that in Addis-Ababa males were more likely to smoke compared to females. However, reports on gender differences in adolescents' smoking behavior in other countries are controversial, ranging from higher prevalence in boys[6,28] or in girls[29,30] to no significant difference.[31] The additional concern is gender, which is gradually shifting towards increased prevalence of smoking among females, notably among youths in Iran and many other countries.[3,7,32] Although no such inference can be drawn from this study in case of Bangladesh, concern rises because of the increasing pattern of smoking.[24, 25]

The findings of this study further revealed that male garment workers were more likely to get cough compared to female garment workers. However, in other studies a higher prevalence of nocturnal and non-productive cough was reported in women than in men.[33] Education reflects knowledge and skills which influences health-related behavior, whereas income is an indicator of the current material situation.[34] As expected the finding of this study revealed that garment workers with some years of formal education were more likely to take BCG vaccination compared to those with no education and were less likely to have the problem of cough. This study further revealed that cough among garment workers was associated with working as well as living environments of the workers. Unexpectedly, the finding of this study also revealed that insufficient light-air had significant lower odds of cough compared to that of sufficient light-air. If mechanical ventilation and air conditioning system is not well-maintained, it can become a reservoir or amplifier for micro-organisms.[35] Hence, such an outcome may not be attributed to sufficient light air rather it could be due to the maintenance of mechanical ventilation and air conditioning system.

The finding of this study also revealed that insufficient sitting arrangement had lower odds of cough than that of sufficient sitting arrangement. It is to note that crowding of any sort increases the possibility of respiratory infection because the number of microorganisms in the air a person breathes is much greater when larger numbers of people are crowded into small spaces.[36, 37] However, lower likelihood for cough with higher number of persons living in a room may be because of other reasons including cleanliness and health awareness of the garment workers.

The finding of this study also indicated that garment workers with higher length of living room had higher odds for cough. However, this study found lower likelihoods for cough with longer width of the living room. It is to be noted that in Bangladesh, many of the garment factories are not purpose built, rather it is a rented accommodation with almost no/low facilities for the workers, and there being no health facility at all for them.

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Table 1 : Distribution of Participant's Background Characteristics

Characteristics	Frequency	Percent	Cumulative Percent
Age*			
≤24	3867	66.3	66.3
25-34	1562	26.8	93.1
≥35	400	6.9	100.0
Gender status			
Female	3579	61.4	100.0
Male	2250	38.6	38.6
Respondents' level of education			
No Education	766	13.1	13.1
1-5 years education	1985	34.1	47.2
6-10 years education	2798	48.0	95.2
>10 years education	280	4.8	100.0
Marital status			
Married	2884	49.5	49.5
Unmarried	2654	45.5	95.0
Widowed/divorced/others	291	5.0	100.0
Job status			
Sewing	4157	71.3	71.3
Quality	849	14.6	98.9
Others	823	14.1	100.0
Amount of salary			
≤2000	1841	31.6	31.6
2001-4000	3711	63.7	95.2
≥4001	277	4.8	100.0

*Mean 23.5(5.5)

Table 2 : Distribution of Participant's Working Environment

Characteristics	Frequency	Percent	Cumulative Percent
Room size at workplace (in sq ft)*			
≤4000	508	8.7	8.7
4001-6000	1396	23.9	32.7
6001-8000	2745	47.1	79.8
≥8001	1180	20.2	100.0
Number of persons working in a room			
≤100	831	14.3	14.3
101-200	1880	32.3	46.5
201-300	1158	19.9	66.4
≥301	1960	33.6	100.0
Status of light-air in working room			
Sufficient	3811	65.4	65.6
Insufficient	2008	34.6	100.0
Sitting arrangement			
Sufficient	2987	51.2	51.3
Insufficient	2842	48.8	100.0

*Mean 6823(1610.5)

Table 3 : Distribution of Participant's Living Environment

Living Environment	Frequency	Percent	Cumulative Percent
Living Place			
Slum in City	795	13.6	13.6
Not slum in City	5034	86.4	100.0
Number of person in living room			
≤2	1330	22.8	22.9
3-4	2997	51.2	74.3

5-6	1298	22.1	96.5
7-8	204	3.5	100.0
Length of living room (in ft)			
≤6	2074	36.2	36.2
7-8	2724	45.8	82.0
≥9	1031	18.0	100.0
Width of living room (in ft)			
≤4	667	11.4	11.7
5-7	4106	68.7	81.8
≥8	1056	17.8	100.0

Table 4 : Odds Ratio (OR) of Smoking, Cough and BCG vaccination by Background Characteristics

Characteristics	Smoking		Cough		BCG Vaccination	
	OR	SE	OR	SE	OR	SE
Age*						
≤24	1.000		1.000		1.000	
25-34	0.576**	0.189	1.291	0.167	3.812***	0.157
≥35	0.783	0.174	1.305	0.172	5.265***	0.159
Gender status						
Female	1.000		1.000		1.000	
Male	24.465***	0.169	1.094	0.100	1.066	0.067
Respondents' level of education						
No Education	1.000		1.000		1.000	
1-5 years education	1.153	0.182	0.781	0.228	1.058	0.138
6-10 years education	1.194	0.160	0.666	0.235	1.409	0.159
					1.409*	
>10 years education	1.331	0.235	0.594*	0.251	1.131	0.144
Marital status						
Married	1.000		1.000		1.000	
Unmarried	2.223	0.183	1.800	0.182	3.166	1.123
Widowed/divorced/others	2.950	0.184	1.806	0.186	3.663	1.124
Job status						
Sewing	1.000		1.000		1.000	
Quality	1.211	0.820	0.382	0.741	1.554	0.399
Others	1.886	0.822	0.406	0.739	1.341	0.404
Amount of salary						
≤2000	1.000		1.000		1.000	
2001-4000	1.033	0.160	1.010	0.227	0.798	0.154
≥4001	0.921	0.199	1.209	0.089	0.741***	0.063
			1.209*			

***P <0.001, **P <0.01 and *P <0.02 *P <0.05; Abbreviations: SE, standard Error; OR, odds ratio

Table 5 : Odds Ratio of Cough by Participants' Working Environment

Working environment	OR	SE
Room size at workplace (in sq ft)*		
≤4000	1.000	
4001-6000	0.866	0.127
6001-8000	1.978***	0.140
≥8001	1.643**	0.188
Number of person working in a room		
≤100	1.000	
101-200	0.883	0.153
201-300	1.208	0.137
≥301	0.794	0.155
Status of light-air in working room		
Sufficient	1.000	
Insufficient	0.630**	0.163
Sitting arrangement		
Sufficient	1.000	
Insufficient	0.781*	0.118

***P <0.001, **P <0.01 and *P <0.02 *P <0.05; Abbreviations: SE, standard Error; OR, odds ratio.

Table 6 : Odds Ratio of Cough by Participants' Living Environment

Living environment	OR	SE
Living place		
Slum in City	1.000	1.000
Not slum in City	1.070	0.117
Number of person in living room		
≤2	1.000	
3-4	0.905	0.108
5-6	0.593*	0.219
7-8	0.816	0.130
Length of living room (in ft)		
≤6	1.000	
7-8	1.226	0.185
≥9	1.926***	0.107
Width of living room (in ft)		
≤4	1.000	
5-7	0.407***	0.163
≥8	0.382***	0.285

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Gas Chromatographic Investigations of Composition of Spent Tyre Pyrolysis Gasoline

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Abstract - This paper describes a case study in which multiple analytical techniques were used to identify and characterize the composition of spent tyre pyrolysis gasoline obtained from the tyre pyrolysis process. The objective of the study was to describe the spent tyre pyrolysis gasoline and determine its suitable commercial application.

The analytical techniques used for analyses of spent tyre pyrolysis gasoline included gas chromatography-mass spectrometry, gas chromatography with sulfur-chemiluminescence detector and capillary gas chromatography with flame-ionization detector. Examination of the chemical composition of the spent tyre pyrolysis gasoline showed that nearly 90 % of the sample composition is established. Generally, aromatic hydrocarbons and naphthenes are the dominating compounds detected in the spent tyre pyrolysis gasoline obtained from tyres pyrolysis. The content of individual sulfur compounds is also measured. Compared to similar researches only the alkylthiols are identified. The spent tyre pyrolysis gasoline comprise mainly of compounds that are similar to pyrolysis gasoline from naphtha stream cracking, fluid catalytic cracking (FCC) gasoline and straight run naphtha.

Keywords : *GC - MS, GC - FID, GC - SCD, spent tyre pyrolysis gasoline, pyrolysis gasoline from naphtha stream cracking, straight run naphtha, fluid catalytic cracking (FCC) gasoline.*

GJMR-K Classification : *NLMC Code: QY 130, WI 500*

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Antoaneta Pavlova [α], Dicho Stratiev [σ], Ivelina Shishkova [ρ], Magdalena Mitkova [ω], Milcho Skumov [¥] & Tania Tzaneva [§]

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The spent tyre pyrolysis gasoline has high sulfur content what is a reason to make it directly used inapplicable. The straight run naphtha and pyrolysis gasoline from naphtha stream cracking have lowest content of sulfur and the spent tyre pyrolysis gasoline could be blended with the fluid catalytic cracking (FCC) gasoline for hydrotreatment. Also the spent tyre pyrolysis gasoline could be blended with the straight run naphtha to catalytic reforming unit for further processing.

Keywords : GC - MS, GC - FID, GC - SCD, spent tyre pyrolysis gasoline, pyrolysis gasoline from naphtha stream cracking, straight run naphtha, fluid catalytic cracking (FCC) gasoline.

I. Introduction

Scrap tyres are a growing environmental problem because they are not biodegradable and their components cannot readily be recovered. It is estimated that the annual production of scrap tyres throughout the world is 1000 million.(1) Since tyres are designed to be extremely resistant to physical, chemical, and biological degradation, the possibilities for their reuse and recycling by mechanical or chemical means are limited currently.

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However used tyres represent a source of energy and raw chemical products for the petrochemical industry. A different alternative is the recovery of the tyre components by hydrogenation, liquefaction, or pyrolysis.(2,3) Pyrolysis is an alternative disposal method with the possibility for recovery of valuable products from waste tyres and also attractive environmentally and it has been widely studied for years.(4-8) After tyre pyrolysis, three phases are obtained: solid, liquid and gas. The liquid product from the tyre pyrolysis was reported that may be used as fuel oil and diesel fuel.(9-12) Benallal (6) and Roy (13) reported that the light fraction of pyrolytic oil may be used as gasoline additives in amount of about 2% vol. A suitable application of the light pyrolytic product can't be found without measuring of its chemical properties and comparing of its values with the ones specified in products like of gasoline and naphtha.

The aim of this work is to characterize the spent tyre pyrolysis gasoline and determine its suitable commercial application. The spent tyre pyrolysis gasoline, straight run naphtha, fluid catalytic cracking (FCC) gasoline and pyrolysis gasoline from naphtha stream cracking were examined for organic composition by gas chromatography coupled with a mass spectrometry detector, gas chromatography - flame ionization detector and gas chromatography - sulfur chemiluminescence detector.

II. Resources and Techniques

a) Samples

The liquid pyrolytic products were obtained by using proprietary catalytic pyrolysis process of tyre particles at reaction temperature of 400 ^{0}C and pressure of 50 Pa. The yield of products obtained from the pyrolysis process was following: liquid product 46 %, carbon black 38 %, steel 11 % and gas 5 %. The liquid pyrolytic product was distilled by AUTODEST 860 Fisher column that has 15 theoretical trays according to ASTM D 2892 in order to obtain a spent tyre pyrolysis gasoline.(14) The reflux ratio was 10. The liquid pyrolytic product was fractionated in two fractions: gasoline fraction (fraction 35 °C- 200 °C) and heavy pyrolytic oil fraction (200 ^{0}C -FBP). Obtained spent tyre pyrolysis gasoline was investigated. The straight run naphtha (fraction 40 °C -180 °C), fluid catalytic cracking (FCC)

gasoline (fraction 36 °C- 194 °C) and pyrolysis gasoline from naphtha stream cracking also were analyzed and they were produced by LUKOIL Neftohim Burgas, Bulgaria.

b) Apparatus

The spent tyre pyrolysis gasoline and the rest gasoline and straight run naphtha samples were analyzed directly by gas chromatography techniques. To quantify the different compounds, gas chromatography equipped with a flame ionization detector was used. To identify the compounds in the samples analyzed, gas chromatography/mass spectrometry was utilized. The sulfur compounds distributions were determined by gas chromatography equipped with a sulfur chemiluminescence detector.

Gas chromatography-mass spectrometry analysis was performed with a 7890A GC System equipped with a HP PONA 50 length m × 0.2 mm id × 0.5 μm film thickness, capillary column and 5975C Inert XL EI/CI mass selective detector (Agilent Technologies, Inc., USA). The oven column temperature conditions identical to those used with the gas chromatograph with flame ionization detector. High purity helium was used as carrier gas at a flow rate of 0.8 mL min^{-1}. The injection port was held at 250 °C and the injection volume of sample 0.1 μL of sample.

The mass-selective detector was operated in the electron impact ionization mode (70 eV) with continuous scan acquisition from 15 to 250 *m/z* at a cycling rate of approximately 1.5 scan/s. The parameters were set up with the electron multiplier at 1224 V, source temperature of 230 °C, and transfer line temperature at 150 °C.

System control and data acquisition was achieved by HP G1033A D.05.01 MSD ChemStation revision E.02.00.493. The compounds were identified by means of the NIST MS Search version 2.0 mass spectral library using similarity indices of > 85 %, or by comparison with published GC-MS data for similar products.

The gas chromatograph with flame ionization detector was a model 5890 series II Hewlett Packard (Agilent Technologies, Inc., USA). A capillary column, HP PONA (50 m length × 0.20 mm id x 0.5 μm film thickness), was used and was provided with split injector. The instrument parameters were as follow: initial oven column temperature of 40 °C, then increased at increments of 2 °C.min^{-1} to 130 °C and second temperature gradient of 5 °C.min^{-1} to 180 °C and held for 20 min at 180 °C. Helium was used as a carrier gas at a flow rate of 0.5 mL min^{-1}. The injector and the detector temperatures were 250 °C and 260 °C respectively. The volume that was injected and analyzed was 0.1 μL.

Data acquisition parameters, instrument operation and chromatographic data were collected and recorded by means of Clarity 2.6.

The gas chromatograph was a model 7890A coupled to a sulfur chemiluminescence detector series model 355 (Agilent Technologies, Inc., USA). A 30 m HP-1 capillary column 320 μm id with 4 μm film thickness was used. The GC separation was performed under the following conditions: helium as carrier gas, column temperature programmed from 50 °C 4 min to 120 °C at a rate of 20 °C.min^{-1}, hold 4 min and to 220 °C at a rate of 10 °C.min^{-1}, hold 4 min. Injector in split mode at a temperature of 240 °C (split vent 131.7 ml.min^{-1}, column 2.6 ml.min^{-1}, purge vent 3 ml.min^{-1}, split ratio 50 : 1) was used. The SCD detector was set to the following conditions: burner temperature 800 °C, vacuum of burner 370 torr, vacuum of reaction cell 7 torr, hydrogen 40 ml.min^{-1}, air 60 ml.min^{-1}. The injection volume was 1.0 μl.

III. Discussion

The main objective was to investigate the composition of spent tyre pyrolysis gasoline and to examine its application as additions to feedstock for hydrotreatment or petrochemical production units for further processing or to petrochemical products suitable for direct use as a fuel or raw chemical feedstock.

There are more than 300 individual compounds which are defined in the spent tyre pyrolysis gasoline. It can be seen that, the investigated spent tyre pyrolysis gasoline is a very complex mixture of organic compounds. However, it is sufficient to identify and characterize several dozens of major hydrocarbons in the C_4-C_{12} range. The most abundant compounds, with peak areas around or great 0.3 % are listed in Table 1. The isomeric structures of compounds 1-methyl-4-(1-methylethenyl)-cyclohexene (limonene) (№№ 39 - 41) has not been determined, due to the limitation of the GC - MS to differentiate isomers. There are such a great number of compounds in the spent tyre pyrolysis gasoline that the peak areas are very low and in the same table the concentrations of these compounds is not given.

Data Table 1 show that there are several oxygenated compounds, such as alkylfurans, alcohols and ketones, which amount up to 0.50 - 0.70 %. The oxygenate compounds in the spent tyre pyrolysis gasoline were also detected by previous studies.[16, 17] The presence of sulfur and oxygenate compounds may be explained by thermal decomposition of the tyre additives used as agents of vulcanization. [18]

GC analysis revealed that the spent tyre pyrolysis gasoline is formed from mixture of low and high molecular weight organic compounds. They are identified by GC - MS full scan analysis of sample and are classified into different classes of compounds-paraffins (consisting of n-alkanes and isoalkanes), naphthenes (cycloalkanes), olefins (mono- and di-alkenes), aromatic hydrocarbons, hetero-containing

components (sulfur and oxygen) and unknowns to facilitate interpretation of the spent tyre pyrolysis gasoline composition. A comprehensive list of identified compound groups is presented in Table 2. Data results compare the PONA analyses of spent tyre pyrolysis gasoline and the rest gasolines and straight run naphtha samples. The majority hydrocarbon compounds in spent tyre pyrolysis gasoline and fluid catalytic cracking (FCC) gasoline are in the C_4-C_{12} carbon range, but C_4-C_9 and C_4-C_{11} carbon ranges are detected respectively in pyrolysis gasoline from naphtha stream cracking and straight run naphtha samples. The study showed that the spent tyre pyrolysis gasoline, containing C_4 - C_{12} hydrocarbons, are comprised mainly of C_6 - C_{10} hydrocarbons, and which are dominated by aromatic hydrocarbons (35.6 %) and significant amounts of naphthenes (29.6 %). The saturated hydrocarbons are mostly paraffins and there is a difference between their levels in the samples investigated. The content of paraffins in the spent tyre pyrolysis gasoline is 9.36 %, while the one represent a potentially high level in the pyrolysis gasoline from naphtha stream cracking, straight run naphtha and fluid catalytic cracking (FCC) gasoline samples (18.68 %, 51.03 % and 23.75 %, respectively).

Olefins present C_4-C_{10} carbon range in spent tyre pyrolysis gasoline and theirs content is 15.93 %. The olefins content in the rest investigated gasoline and straight run naphtha samples is 22.11 %, 35.29 % and 0.93 %, respectively. The result 15.93 % for olefins in spent tyre pyrolysis gasoline falls well within the range of the olefins in tested samples. The spent tyre pyrolysis gasoline and pyrolysis gasoline from naphtha stream cracking contain some undesirable compounds like the di-alkenes which are highly reactive to polymerization and plug the downstream refining processes. These compounds also affect the gasoline samples stability. Table 2 presents the comparison between measured content of di-alkenes in tested samples. The content of majority di-alkenes in spent tyre pyrolysis gasoline is 7.76 % and they are in the C_6 - C_{10} carbon range, while in the pyrolysis gasoline from naphtha stream cracking same are 17.16 % and they are in the C_5 - C_8 carbon range.

Light aromatics such as benzene and toluene are found in significant quantities (10.46 %) in the spent tyre pyrolysis gasoline as compared to straight run naphtha and fluid catalytic cracking (FCC) gasoline (1.69 % and 5.76 %, respectively). The aromatic hydrocarbons are composed mainly of single ring alkyl aromatics, including benzene derivatives such as alkyl and alkenyl groups. The radical chains attached to the benzene ring ranged from C_1 to C_5. Alkyl-naphthalenes are observed in the spent tyre pyrolysis gasoline but only in minor quantities $\leq$ 0.7 %.

Identification of compounds are studied in detail and based on GC peak comparisons in the analyzed samples the distribution of hydrocarbon groups is shown in Figure 1. It is interesting to note that the composition of the spent tyre pyrolysis gasoline distinguishes from that of the samples investigated.

Identification of sulfur compounds is carried out by using standard sulfur compounds and the result of GC - MS combined with the retention time of the compounds by GC - SCD. Sulfur compounds such as thiols, alkylsulfides, alkyldisulfides, and alkylthiophenes are detected in the spent tyre pyrolysis gasoline. The most distinguished sulfur compounds identified are shown in Table 3 and they are ethanethiol, 2 - propanethiol, 1 - propanethiol, 2 – methyl – 2 – propanethiol, 2 – methyl – 1 - propanethiol, 1 - pentanethiol, thiophene, 2 - methylthiophene, 3 - methylthiophene, 2 – ethylthiophene, 3 - ethylthiophene, 2, 5 – dimethylthiophene, 2, 4 - dimethylthiophene, 2, 3 – dimethylthiophene, 2 - [1 - methylethyl] - thiophene, 2 – butylthiophene. Table 3 data shows that spent tyre pyrolysis gasoline contain considerable quantity alkylthiophenes. The presences of alkylthiophenes are in agreement with the published data of similar products. [6] With respect to sulfur containing compounds, alkylthiols are only identified components in this research. The total sulfur content in sample analyzed varies between 0.056 % and 0.48 % and alkylthiophes and alkylthiols percentages are between 15 % and 77 %, and 5 % and 63 %, respectively.

The spent tyre pyrolysis gasoline is examined for their properties as a regular gasoline and these values are compared to those of the fluid catalytic cracking (FCC) gasoline, pyrolysis gasoline from naphtha stream cracking and straight run naphtha samples (Table 4). Compared with the rest gasolines and naphtha samples (content of aromatics varies from 13.8 % to 51.56 %) the aromatics of the spent tyre pyrolysis gasoline, respectively 35.60 %, are close to that for pyrolysis gasoline from naphtha stream cracking and fluid catalytic cracking (FCC) gasoline, and it is also within the prescribed value 35.0 % given in EN 228:2012. [15] The olefins content of spent tyre pyrolysis gasoline is found to be lower than that in fluid catalytic cracking (FCC) gasoline and pyrolysis gasoline from naphtha stream cracking samples and it is also within the prescribed value 18.0 % given in EN 228 : 2012. The content of benzene of the spent tyre pyrolysis gasoline is found to be lower than that in fluid catalytic cracking (FCC) gasoline and pyrolysis gasoline from naphtha stream cracking samples and it also within the prescribed value 1.0 % v/v.

The spent tyre pyrolysis gasoline has high contents of sulfur what is a reason to make it directly used inapplicable. The straight run naphtha has lowest content of sulfur and the spent tyre pyrolysis gasoline could be blended with the feedstock (fluid catalytic cracking (FCC) gasoline) for hydrotreatment or with the pyrolysis gasoline from naphtha stream cracking for

further processing as a feedstock for the production of aromatic hydrocarbons which are required for organic synthesis.

IV. Conclusion

This research study sought to understand the composition of spent tyre pyrolysis gasoline obtained from catalytic pyrolysis process of tyre and the connection between spent tyre pyrolysis gasoline properties and the fluid catalytic cracking (FCC) gasoline, pyrolysis gasoline from naphtha stream cracking and straight run naphtha samples investigated. A desired to understand how to use best advantage this spent tyre pyrolysis gasoline provide motivation for this work.

In view of the fact that the gasoline properties strongly depend on chemical composition, the GC quantitative profiles of spent tyre pyrolysis gasoline, pyrolysis gasoline from naphtha stream cracking, straight run naphtha and fluid catalytic cracking (FCC) gasoline are investigated. For comparison, data of samples compositions are given, using GC - FID and GC - SCD analyses and GC - MS identification. Data interpretation clearly indicates that a detailed identification and quantitative compound analysis was successfully carried out. Distribution of hydrocarbons, sulfur- and oxygen-containing compounds is researched and the evaluation of the possible ways of reusing such obtained liquid product is completed. The spent tyre pyrolysis gasoline from spent tyres may be processed in a hydrotreatment unit or co-processed with stream cracking pyro-gasoline.

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Table 1 : Composition of spent tyre pyrolysis gasoline

№	Compound	Area, %
1	n-Pentane	0.32
2	n-Hexane	0.49
3	n-Heptane	0.76
4	n-Nonane	1.16
5	n-Dodecane	0.68
6	2,4-Dimethyl-pentane	0.49
7	2,2,3,3-Tetramethyl-butane	0.36
8	3-Methyl-hexane	0.36
9	2-Methyl-heptane	0.43
10	2,2,4,4-Tetramethyl-pentane	0.79
11	2,6-Dimethyl-heptane	0.64
6.48		
12	1-Butene	0.50
13	Isobutylene	0.53
14	2-Methyl-1-butene	0.47
15	4-Methyl-1-pentene	0.26
16	2-Methyl-1-pentene	0.43
17	2-Methyl-2-pentene	0.56
18	3-Methyl-2-pentene	1.31
19	2,4-Dimethyl-2-pentene	0.46
20	4-Methyl-1-hexene	0.28
21	4-Methyl-2-hexene	0.33
22	3-Methyl-3-hexene	0.32
23	3-Methyl-2-hexene	0.35
24	3,4,4-Trimethyl-2-pentene	0.33
25	3-Ethyl-hexene	0.69
6.82		
26	1,2-Dimethyl-dicyclopropane	1.89
27	Cyclopentane	0.20
28	1,2,3-Trimethylcyclopropane	0.52
29	Methylcyclopentane	0.36
30	1,2-Dimethylcyclopentane	0.50
31	1,1,2-Trimethylenecyclopropane	0.75
32	1-Methylethyliden-cyclobutane	2.50
33	1,3-Dimethylcyclohexane	0.37
34	1,5-Dimethylbicyclo[3.1.0]hexane	0.86
35	iso-Propylcyclopropane	0.56
36	Ethylmethylcyclohexane	0.41
37	2-[1-Methyl-2-propenyl]bicyclohexane	0.48
38	1-Methylethylidencyclohexane	0.52
39	1-Methyl-4-(1-methylethenyl)-cyclohexene (Limonene)	7.65
40	1-Methyl-4-(1-methylethenyl)-cyclohexene (Limonene)	1.52
41	1-Methyl-4-(1-methylethenyl)-cyclohexene (Limonene)	0.95
42	3,7,7-Trimethyl-bicyclo[4.1.0]heptane (tr-Caren)	0.70
43	1,4,6,6-Tetramethyl-cyclohexene	0.55
44	Cyclopentene	0.25
45	1-Methylcyclopentene	0.93
45	Cyclohexene	0.34
47	4,4-Dimethylcyclopentene	0.51
48	1-Methylcyclohexene	0.76
49	1,2,3-Trimethylcyclopentene	1.15
50	3,5-Dimethylcyclohexene	0.54
51	4-Ethylcyclohexene	0.42
52	1-Ethyl-5-methylcyclopenten	0.49
53	3-Methyl-ethylcyclohexene	0.71
27.39		
54	5-Methyl-1,3-cyclopentadiene	0.38
55	1,3-Hexadiene	0.44
56	2,4-Dimethyl-1,3-pentadiene	1.29
57	2,3-Dimethyl-1,3-hexadiene	0.35
58	3-Methyl-1,5-heptadiene	0.98
59	3-Ethyl-2-methyl-1,3-hexadiene	1.06
60	2,6-Dimethyl-1,3,6-heptatriene	0.48
61	4,5-Dimethyl-1-propyl-1,3cyclopentadiene	0.37
62	1-Methyl-4-(1-methylethyl),1,4-cyclohexadiene (α-Terpinen)	1.10
63	3-Ethyl-2-methyl-1,3-hexadiene	0.79
64	cis-2,6-Dimethyl-2,6-octadiene	1.90
5.35		
65	Benzene	0.48
66	Toluene	4.38
67	Ethylbenzene	3.41
68	m-+p-+o-Xylenes	5.60
69	Styrene	1.03
70	iso-Propylbenzene	1.73
71	n-Propylbenzene	1.53
72	1-Ethyl-3-methyl-benzene	1.60
73	1-Ethyl-4-methyl-benzene	1.00
74	1-Ethyl-2-methyl-benzene	1.20
75	1,3,5-Trimethylbenzene	1.20
76	1,2,4-Trimethylbenzene	1.10
77	1,2,3-Trimethylbenzene	0.90
78	1-Methyl-2-(1-Methylethyl)-benzene	4.34
79	1-Methyl-3-propyl-benzene	1.52
80	2,4-Dimethyl-1-ethyl-benzene	0.65
81	4-Methyl-indan	0.45
82	3,4-Dimethyl-styrene	0.85
83	1,6- +2,2-Dimethyl indans	0.51
33.48		
84	Furane	0.20
85	2-Metyl-1-pentanol	0.70
86	Methyl isobutyl ketone	0.35
87	3-Nonyn-1-ol	0.22
88	4-Ethyl-1-octyn-ol	0.12
1.59		
89	2-Methyl-thiophene	0.15
90	2-[1-methylethyl]-thiophene	0.09
91	Ethylmercaptan, 1-(4-methoxymethyl) phenyl	0.07
92	Benzothiazole	0.11

Table 2 : Hydrocarbons range of the spent tyre pyrolysis gasoline, pyrolysis gasoline from naphtha stream cracking, straight run naphtha and fluid catalytic cracking (FCC) gasoline

Hydrocarbons range	Composition, wt%					
	Paraffines (*n-alkanes and isoalkanes*)	Olefins		Naphthenes	Aromatics	Total
		Mono - alkenes	*Di- alkenes*			
Spent tyre pyrolysis gasoline						
C_4	0.05	0.90	-	-	-	0.95
C_5	0.53	0.70	0.14	2.41	-	3.78
C_6	0.66	2.67	0.99	3.05	0.48	7.85
C_7	1.67	2.02	1.97	4.99	4.38	15.03
C_8	1.54	0.93	0.32	5.33	10.04	18.16
C_9	1.95	0.95	2.27	1.60	11.11	17.88
C_{10}	1.30	-	2.07	12.20	8.90	24.47
C_{11}	0.98	-	-	-	0.69	1.67
C_{12}	0.68	-	-	-	-	0.68
Pyrolysis gasoline from naphtha stream cracking						
C_4	-	1.44	0.59	-	-	2.03
C_5	5.96	3.38	8.67	2.77	-	20.78
C_6	12.09	0.13	3.25	3.83	14.78	34.08
C_7	0.63	-	1.62	0.71	13.49	16.45
C_8	-	-	3.03	0.30	13.22	16.55
C_9	-	-	-	0.04	10.07	10.11
Straight run naphtha						
C_4	0.10	-	-	-	-	0.10
C_5	0.12	-	-	0.05	-	0.17
C_6	0.12	0.32	-	0.40	0.01	0.85
C_7	6.65	-	-	6.20	1.68	14.53
C_8	14.89	0.61	-	11.40	5.54	32.44
C_9	15.04	-	-	8.36	4.24	27.64
C_{10}	11.77	-	-	2.69	2.33	16.79
C_{11}	2.34	-	-	-	-	2.34
Fluid catalytic cracking (FCC) gasoline						
C_4	0.38	2.18	-	-	-	2.56
C_5	5.51	11.48	-	0.68	-	17.67
C_6	5.83	9.17	-	1.94	1.08	18.02
C_7	4.47	6.02	-	2.90	4.68	18.07
C_8	2.53	2.78	-	2.05	8.57	15.93
C_9	2.06	1.82	-	1.15	7.85	12.88
C_{10}	1.79	1.09	-	0.99	5.10	8.97
C_{11}	0.54	0.75	-	0.40	0.96	2.65
C_{12}	0.64	-	-	0.21	0.15	1.00

Table 3 : Main sulfur-containing compounds of the spent tyre pyrolysis gasoline, pyrolysis gasoline from naphtha stream cracking, straight run naphtha and fluid catalytic cracking (FCC) gasoline

Sulfur compounds	Sulfur content, $mg.kg^{-1}$			
	Spent tyre pyrolysis gasoline	Pyrolysis gasoline from naphtha stream cracking	Straight run naphtha	Fluid catalytic cracking (FCC) gasoline
C_1-thiol	-	-	-	1.0
C_2-thiols	270	45	95	39
C_3-thiols	151	36	225	23
C_4-thiols	439	39	30	2.0
C_5-thiols	125		-	2.0
Total alkylthiols	**985**	**120**	**350**	**67**
Hydrogen sulfide	-	-	20	1.4
Carbonyl sulfide	-	15	-	0.4
Carbon disulfide	-	-	-	1.1
C_2-sulfide	13	15	63	1.4
C_3-sulfide	27	40	45	2.1
C_4-sulfide	10	-	-	4.1
C_5-sulfide	15	-	-	2.4
Total alkylsulfides	**65**	**70**	**128**	**13**
C_1-disulfides	38	-	-	74
C_2-disulfides	32	140	-	128
Total alkyldisulfides	**70**	**140**	-	**202**
Tiophene	180	175	25	115
C_1-tiophenes	3000	306	57	280
C_2-tiophenes	150	50	-	364
C_3-tiophenes	125	20	-	-
C_4-tiophenes	96	-	-	-
Tetrahydrogen tiophene	145	-	-	27
Total alkyltiophenes	**3696**	**551**	**82**	**786**
Benzotiophene	-	100	-	167
C_1-benzotiophene	-	-	-	96
Total alkylbenzotiophene	-	**100**	-	**263**

Table 4 : Properties the spent tyre pyrolysis gasoline, pyrolysis gasoline from naphtha stream cracking, straight run naphtha, fluid catalytic cracking (FCC) gasoline and regular gasoline

Parameter	Spent tyre pyrolysis gasoline, %	Pyrolysis gasoline from naphtha stream cracking, %	Straight run naphtha, %	Fluid catalytic cracking (FCC) gasoline, %	Regular gasoline, % v/v
Aromatics	35.60	51.56	13.80	28.39	35.0
Olefins	15.93	22.11	0.93	35.29	18.0
Benzene	0.48	14.78	0.01	0.97	1.0
Sulfur	0.48	0.098	0.056	0.13	0.0010

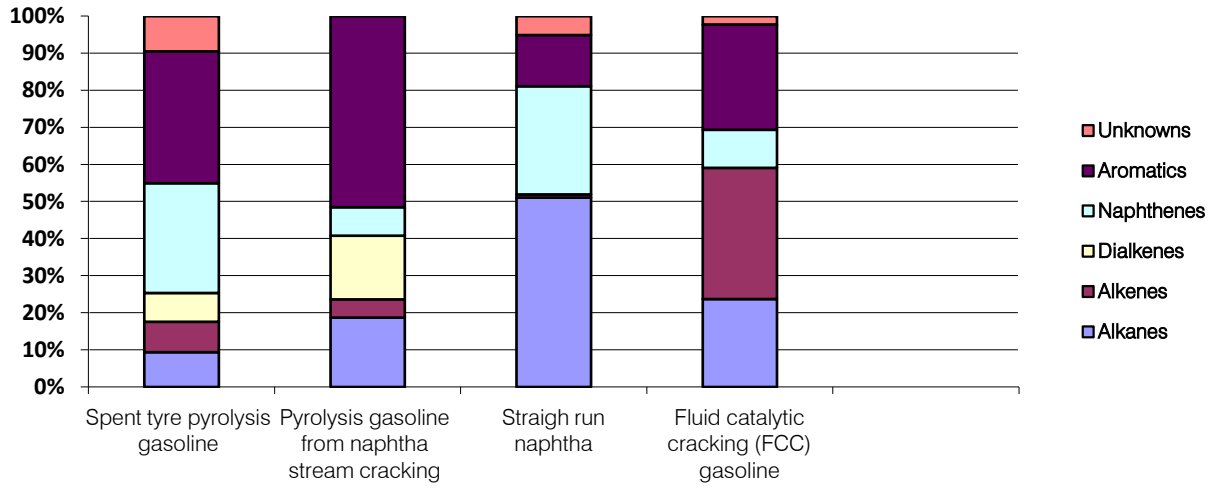

Figure 1 : Distribution of hydrocarbon compound groups in samples analyzed

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Methodology : According to acute physiology and chronic health evaluation (APACHEII), 615 cases of mechanically ventilated patients were divided into group A, group B and group C by stratified random method. Traditional oral nursing plus a secretions from oral cavity and nasal cavity q6h were done in group A. Based on methods in group A, normal saline was used for cleaning nasal cavity in group B. Besides the methods in group A, atomizing nasal cleansing a6h was also used in group C. Incidence rate of Ventilator- Associated Pneumonia (VAP) and APACHE II scores after administrating were compared. The correlation between APACHE II score and outcomes was analyzed by Spearmanrank correlation.

Results : In group A, incidence of VAP was 36.76%, group B was 30.24%, group C was 20.38%, and the difference was statistically significant. APACHE II scores in group C were significantly lower compared with group A and B. APACHE II score was negatively correlated with clinical outcomes.

Conclusions : For mechanically ventilated patients, nasal nursing can't be ignored and the new atomizing nasal cleaning is an effective method for VAP prevention.

Keywords : atomizing nasal cleaning method, mechanical ventilation, ventilator-associated pneumonia.

GJMR-K Classification : NLMC Code: WV 300, WV 320

Strictly as per the compliance and regulations of:

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I. Introduction

Ventilator-associated pneumonia (VAP) is the most common type of nosocomial pneumonia, as well as one common complication and cause of death of patients with mechanical ventilation in intensive care medicine (ICU).[1,2] The established artificial airway damaged the normal respiratory anatomy function, resulting in a high incidence of VAP in mechanical ventilated patients.[3-6] VAP is related with many factors, including original diseases and invasive medical procedures. The original disease is one of the most important personal reasons, and the invasive medical procedure is one of the most important external factors. Studies showed that[6] nursing staff playes an important role in the prevention of VAP. With nursing and prevention measures being further improved, the incidence of infection decreased year by year. From January 2010 to August 2012, 615 mechanically ventilated patients received 3 different respiratory tracts nursing in our hospital, each nursing effect on VAP prevention is studied as follows.

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II. Methodology

Subjects

From January 2010 to August 2012, 615 (including 347 males and 268 females) mechanically ventilated patients received 3 different respiratory tract nursing in our hospital. Age ranged from 21 to 92, with a mean age of 61.3 years old. Among these patients, 94 cases suffered from cerebral hemorrhage, 62 cases had type 2 diabetes, 54 cases had myocardial infarction, 78 cases suffered from large operation, 43 cases had acute respiratory distress syndrome, 35 cases had multiple organ function failure, 31 cases suffered from disseminated intravascular coagulation, 29 cases suffered from other diseases.

What about those patients who were on ventilation for more than 65 days, were they dropped form the study?

a) Inclusion Criteria

1patient with indwelling time > 24h; 2collect deep sputum for culturing before intubation; 3time for Ventilator from 2 to 65 Days, the average time is 16.4 days. The patients who were on ventilation for more than 65 days were dropped from this study.

b) Exclusion Criteria

Patients who used intubation in the past 30 days.

c) Manners of Endotracheal Intubation and Time of Ventilation

Three manners of endotracheal intubation were employed, including tracheostomy, nasal endotracheal intubation and oral endotracheal intubation. Ventilators would assist breath after endotracheal intubation. These patients including 28 cases of tracheotomy, 193 cases through mouth, 394 cases through nose. Four hundred and seventy-five patients' continuous ventilation time less than 15d, 53 patients less than 30d, 42 patients less than 45d, 18 patients less than 60d, 6 patients more than 61d.

d) Diagnosis Criteria

In this study, we diagnosed the disease according to the "criteria for the diagnosis and treatment guideline of hospital-acquired pneumonia".[7] We judged them by which pulmonary infection occurred 48h after artificial ventilation, or the cultivated bacterial strains were different from intubation before, referring to clinical manifestation, radiological examination and etiological examination.

e) Specimen Selection

Specimens were collected from mechanical ventilation works before and after 48h on 3 consecutive days, respectively. Then continuous sampled each time every 48 hours, until 48h after extubation. The sputum was collected from lower respiratory tract secretions using sterile sputum collector.

f) Bacterium Culture and Identification

Smear and quantitative bacteria culture were done immediately after specimens were received. The count of bacteria $> 10^5$CFU/ml or fungus $\geq 10^4$CFU/ml were regarded as pathogenic bacteria. If the same type of bacteria was detected continuously from a patient, it would be identified as one strain.

g) Trial Grouping

According to the score (APACHE II) and the stratified random method, 204 cases were divided into group A, 205 cases into group B, 206 cases into group C. There were no significant differences among the sex, occupation, disease, and intubation manners.

h) Intervention Strategy

1group C, nasal cavity cleaning by spray. The operation was as follows: oral care, suctioned from catheter, suctioned from oral cavity, suctioned from nasal cavity, spraying (nozzle along the nasogastric tubes and tracheal catheters that aimed at nasal wall but did not entry into nose) when head toward back slightly, 4 sprays per nostril each time, 6 hours a round. In order to improve executive power, every nurse should learn to do these. All the data were written down by appointed persons. 2group B, the operations were as follows: oral care, suctioned from catheter, suctioned from oral cavity, cleaned nasal vestibule by saline cotton swab. 3group A, the operations were as follows: oral care, suctioned from catheter, suctioned from oral cavity, suction from nasal cavity.

i) Atomizing Nasal Cleaning

In group A, only suctioning, and without cleaning nasal cavity, which leaded to bacteria also surviving on the surface of mucus. In group B, it was not easy to clean the nasal cavity thoroughly that only used saline cotton swabs to clean nasal vestibule after suctioning the secretions. The main reason might be that tracheal catheters hinder us to clean the dead corner of deep part of nasopharynx easily, which caused the secretion accumulated there. In group C, spraying with Physiological Seawater Nasal Spray nozzle along the nasogastric tubes and tracheal catheters that could cleaned the deep part of nasopharynx and reduced the incidence of VAP caused by colonized bacteria in nasopharynx. The ingredient of Physiological Seawater Nasal Spray is sea salt, and its concentration equal to the concentration of body fluid. The Physiological Seawater Nasal Spray is rich in minerals from sea, such as silver and zinic with bactericidal or antiviral actions, cooper with diminishing inflammation function, manganese with anti-anaphylaxis. Physiological Seawater Nasal Spray could also moistened nasal cavity, dissolve the secretion, get rid of pathogenic microorganism in the mucus, and reduce the incidence of VAP which caused by bacteria accumulation in nasopharynx and on the external wall of catheter. This manner is simple and has a high compliance.

j) Observing Indexes

Participant: 1VAP occurred when 48h after mechanical ventilation or artificial tracheas were removed after mechanical ventilation. 2patients who suffered from pneumonia before, while new pathogenic bacterias were also detected now. Observing indexs: 1temperature $\geq$ 38.0℃; 2purulent secretion was suctioned from airway; 3new pathogenic bacterias were detected from patients who had suffered from infection or pathogenic bacterias; 4bacterias were detected from patients who had not suffered from infection; 5X ray detection taken at bedside showed a new shaded area or a enlarged shaded area in lung; 6leukocyte count $>$ 10.0×10^9/L or $<4.0\times10^9$/L, with or without nuclear shift to the left.

k) Statistical Analysis

Statistical analysis was performed by using SPSS 10.0. $\div^2$ test or Fisher's exact test were used in enumeration data, and Spearman rank correlation was used in correlation analysis.

III. Results

a) Incidence of VAP

The incidence of VAP was classified into 3 sections, including the total incidence, the early incidence (VAP occurred in 4 days when mechanical ventilation was used), the delayed incidence (VAP occurred after 4 days when mechanical ventilation was used). The total incidence of group A was 36.76% (75 cases in 204 patients), group B was 30.24% (62 cases in 205 patients), group C was 20.38% (42 cases in 206 patients). From the Table-I, we could found that there were significant differences among the three groups ($P<0.05$). The total incidence rate in group C was lower significant compared with the group A and group B (both $P<0.01$), and group C was lower significant compared with the group B ($P<0.05$). In addition, the

early incidence and the deferred incidence of group A were also significantly higher compared with that of group B and group C ($P<0.05$ and $P<0.01$, respectively). Meanwhile, the early incidence and deferred incidence of group C were significantly lower compared with that of group B ($P<0.01$ and $P<0.05$, respectively) (Table-I).

b) Sputum Culture Analysis

179 sputum specimens were cultured, including 75 specimens in group A, 62 specimens in group B and 42 specimens in group C. In group A, 215 strains of bacteria were identified, including 104 strains of gram positive bacteria, 104 strains of gram negative bacteria and 15 strains of fungus. In group B, 189 strains of pathogenic bacterium were isolated, including 89 strains of gram positive bacteria, 85 strains of gram negative bacteria and 15 strains of fungus; In group C, 78 strains of pathogenic bacteria were isolated, including 35 strains of gram positive bacterium, 36 strains of gram negative bacterium and 7 strains of fungus. According to Table-II, we discovered that for all of the index (infected cases, pathogenic bacterium, gram-positive bacteria, gram-negative bacteria and fungus), group C was significantly fewer compared with those of group A and B (all $P<0.01$, except for $P<0.05$ in fungus) and group B was also significantly lower compared with those of group A (all $P<0.01$, but not difference in fungus). In addition, we also found that Bauman Acinetobacter, Pseudomonas aeruginosa, Klebsiella, E. coli were the main bacteria in this three group (data not shown).

c) APACHE II Score

In this study, APACHE II score was also observed after administrating the three groups nursing methods. The results indicated that after the nursing assistants, the APACHE II scores in group C were significantly lower compared with that in group A and group B (Fig. 1). ($P<0.01$ and 0.05, respectively). Moreover, the APACHE II scores in group B were also significantly lower compared with that in group A ($P<0.05$).

d) Correlation between the APACHE II score and the prognosis

In order to assess the relationship between the APACHE II score and the disease prognosis, the correlation analysis was performed. From the Fig. 2, we could find that the APACHE II score was negatively correlated with the clinical outcome ($r=-0.87063$, $P<0.05$).

IV. Discussion

Large amounts of dirt and germs will accumulate in the nasal cavity under normal situation. Normally, the receptors which could bind to bacteria distributed on the surface of nasopharyngeal epithelial cell, and were covered by nectin of cellulose.[8] The nectin could make the bacteria can't colonize at the epithelial cells.[9] There was stress among the serious patients who needed to spile, such as hypotension, hypoxia, acidosis, and act. At the time, proteolytic enzymes of secretion in pharyngeal were elevated, which could catalyze the nectin of cellulose that on the surface of nasopharyngeal epithelial cell.

Finally, receptors on the surface of cells were exposed, and the opportunity of colonization was increased. At the same time, nose failed to clean itself, which lead to bad situation in nasal cavity. So bacteria accumulated and multiplied faster. For the tracheal catheter hindering swallow, secretion accumulated in nasal cavity and oral cavity most of the time. Especially in coma patients, bacteria in the secretion along the catheter entry into respiratory tract through sub-glottic area, which leaded to bacteria move down and increased the incidences of VAP.[10] Routine respiratory tract management might often ignore the completely cleaning of the secretion in nasal cavity, especially in patients who needed indwelling gastric tubes or indwelling tracheal catheters. The patients were easy to be complicated by nasosinusitis, because it was difficult to remove the secretion.[6] So clearing the contaminated nasal cavity immediately, especially in the deep part of the cavity, were very important for VAP prevention. Keeping clean of the nasal cavity, and getting rid of feculence stayed in the nasal cavity or on the wall of the tracheal catheters, were key factors to reduce the incidence of VAP.

In the present study, the incidence of VAP in group C was lower than that in group B ($P < 0.05$) and group A ($P < 0.01$). Because of swallowing reflex, cough reflex and lower respiratory tract ciliary movement weakened or lost in patients with mechanical ventilation, the throat secretions and colonized bacteria were accumulated on the external wall of catheter. So the accumulated bacteria could form "mucus paste" and became warehouse of bacteria. Cleanliness of nasal cavity and nasopharynx were highly associated with the infection of lower respiratory tract.

This study showed that the incidence of VAP in group C was 20.38%, which was lower than group B (30.24%) and group a (36.76%). The results demonstrated that cleaned nasal vestibule by saline cotton swabs could not clean the bacteria stayed in the deep part. Moreover, normal saline have the capacity of sterelization and antivirus, so method of B can also prevent VAP. There was a tight relationship between VAP and nasal cavity nursing, so searching for an effective nasal cavity nursing was very important.

The main microorganisms of this study were Gram-negative bacteria, including Bauman Acinetobacter and Pseudomonas aeruginosa. In addition, there were also a few Gram-positive bacteria and fungus. Within 48 hours of mechanical ventilation,

normal Gram-positive streptococci changed into Gram-positive bacteria with powerful pathogenicity. When these Gram-positive bacteria inspirated into lungs, which became the main reasons that caused VAP on patients with mechanical ventilation.

The APACHE II scores were also assessed after the nursing methods administrating. And found that group A showed a significant lower APACHE II score compared with the group B and C. So the results indicated that the new atomizing nasal cleaning method could improve the APACHE II score significantly, which was consistent with the previous study.[6] The correlation analysis indicated that there was a negative correlation between the APACHE II score and the disease outcomes, which was consistent with the previous studies.[11,12] An better outcome would be received when declined the APACHE II scores, so the group A could improve the disease prognosis with a good outcome.

To summary, nasal cavity nursing is important for the patients with catheters, which is consistent with the former studies.[13,14] The improvement of the nasal cavity method and strengthening of nasal cavity nursing could reduce VAP caused by colonized bacteria in nasopharynx and oral cavity. Prevention and nursing of VAP is a systemic engineering, plays a key role in improving medical quality. To prevent the colonization of pathogenic bacteria in nasopharynx, the management of respiratory tract is very important. In addition, changing position, effective aspirating secretion, strict sterilization, and effective oral nursing could stop the moving down of bacteria in throat, which is an important factor for VAP prevention. Thus, the new nasal spray cleaning method could reduce mortality, length of stay, the average hospitalization expenses, and improve the medical and nursing quality.

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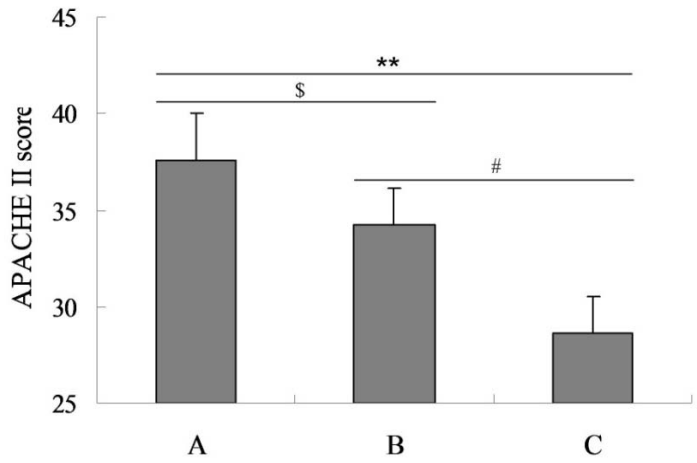

Figure 1 : Comparison of APACHE II score among three groups. **P<0.01, C group vs A group; $^{\#}$P<0.05, C group vs B group; $^{\$}$P<0.05, B group vs A group

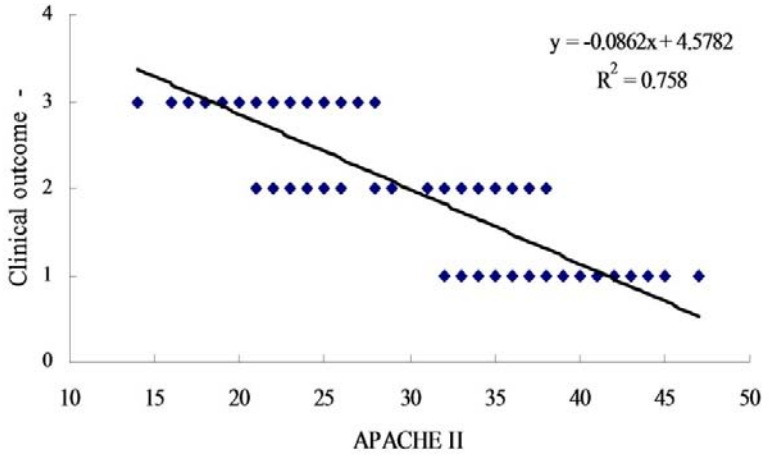

Figure 2 : Correlation analysis between APACHE II score and clinical outcome

Table 1 : VAP rate (%) in the three groups. Mention p value here in this table

Group	Total Cases	Total Vap Csase (%)	Early Vap Cases (%)	Delayed Vap Cases (%)
A	204	75(36.76)	32(15.7)	54(26.5)
B	205	62(30.24)$^{\$}$	24(11.7)$^{\$}$	46(22.4)$^{\$}$
C	206	42(20.38)$^{**,\#\#}$	6(2.9)$^{**,\#\#}$	29(14.0)$^{**,\#}$

**P<0.01 represents the group C *VS* group A; $^{\#\#}$P<0.01 represents the group C *VS* group B; $^{\$}$P<0.05 represents the group B *VS* group A.

Table 2 : Sputum culture results of three Groups

Group	Infected cases (%)	Pathogenic bacterium (n)	Gram-positive bacterium (n)	Gram-negative bacterium (n)	Fungus (n)
A	75(36.76)	215	104	96	15
B	62(30.24)$^{\$\$}$	189$^{\$}$	89$^{\$}$	85$^{\$}$	15
C	42(20.39)$^{**,\#\#}$	78$^{**,\#\#}$	35$^{**,\#\#}$	36$^{**,\#\#}$	7$^{*,\#}$

**P<0.01, *P<0.05 represents the group C *VS* group A; $^{\#\#}$P<0.01, $^{\#}$P<0.05 represents the group C *VS* group B; $^{\$}$P<0.05 represents the group B *VS* group A.

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Prevalence and Associated Factors of Unmet need for Family Planning among Married Women in Enemay District, Northwest Ethiopia: A Comparative Cross-Sectional Study

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Abstract - Introduction : Millions of women want to delay or avoid pregnancy but are not using contraception. Ethiopia has the highest levels of unmet need for family planning among African countries. The 2011 Ethiopia Demographic and Health survey found that 25.3 percent of women had unmet need for family planning, 16.3 % for spacing and 9 % for limiting. Thus, this study was designed to assess the prevalence and associated factors of unmet need for family planning in Enemay district, Nortwest Ethiopia.

Methods : Community based comparative crosssectional study design was employed using multi-stage sampling technique. Data were collected through interviewing married reproductive age women using semi-structured questionnaire. Data were entered and analyzed using Epi data version 3.1 and SPSS version 16 statistical software respectively.

Keywords : family planning, unmet need, married women, Ethiopia.

GJMR-K Classification : NLMC Code: WA 550

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Results : The overall unmet need for family planning was 193 (25.6%) of which 119 (15.8%) was for spacing and 74 (9.8%) for limiting. It was 69 (18.4%) and 124 (32.7%) in urban and rural areas of the district respectively. Age at first marriage, educational status of the women and their partners, partner attitude towards family planning services utilization, current menstrual status, healthcare providers visit and discussion about family planning issues were the main predicting factors of unmet need for family planning.

Conclusion : The overall prevalence of unmet need in the district was high. Empowering women through education and healthcare providers visit should be strengthened.

Keywords : family planning, unmet need, married women, Ethiopia.

I. Introduction

Family planning (FP) began to be viewed as a way of making changes in women's lives, securing women's empowerment and ensuring their well being (Cleland J, 2006).

Unmet need for FP is the number or percent of women currently married (in union) who are fecund and who desire to either terminate (do not want anymore) or postpone (at least 2 years) childbearing, but who are not currently using a contraceptive method (John A, et al., 2002).

Around the world, about 222 million women have an unmet need for FP and 645 million women have their needs met through the use of a modern contraceptive method such as intra-uterine device (IUD), pills, injectables or sterilization [9]. Every minute, nine children under age 5 die in Africa which resulted in death of 4.8 million children annually. Family planning could prevent many of these deaths by enabling women to bear children during the healthiest times for themselves and their children (David O, 2008).

Evidence on the benefits of FP for maternal and child health, poverty reduction strategies and women's empowerment is quite clear. In Sub-Saharan Africa for example, it is estimated that provision of FP services reduces unintended pregnancies by 77% (i.e. from 17 million to 4 million annually); reduces unsafe abortions from 5.2 million to 1.2 million; and reduces the number of women in need of medical care from unsafe abortion from 2.2 million to 500,000. It is therefore clear that FP is a valuable economic investment. Reducing unmet need would significantly reduce unintended pregnancies, abortions, and maternal and child deaths. A current projection for Ethiopia estimates 56 million pregnancies from 2005 to 2015, of which nearly 24 million would be unintended. By meeting unmet need in Ethiopia, there would be almost 6 million fewer unintended pregnancies, which would lead to nearly 2 million fewer abortions. Moreover, more than 1 million infant and child deaths (under age 5) would be averted and nearly 13,000 maternal deaths would be averted over the 10-year period (Family Planning Conference, 2009).

Ethiopia has among the highest levels of unmet need for contraception in Africa. The 2011 Ethiopia Demographic and Health survey (EDHS) found that 25.3 % of women had unmet need for FP, 16.3 % for spacing and 9 % for limiting. Unmet need for both spacing and limiting is higher among rural residents than their urban counter parts. The general unmet need for FP among urban and rural dwellers is 15% and 27.5% respectively (ICF International, 2012).

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A proper understanding of the extent of unmet need for FP among currently married women of reproductive age and associated factors are of paramount importance in tackling the problem of unmet need for FP, which paves the way for the improvement of the prevailing socioeconomic problems of the country. Particularly, it would have a substantial contribution in the improvement of the health status of women and children.

Unmet needs for contraception have a tendency to be influenced unequally among different settings mainly due to the effect of socio-economic and demographic variables.

The availability of accurate information and high quality FP services enable people to make informed choices. In Ethiopia, however, it is clear that factors affecting FP use are area-specific and require different approaches. Hence, this study examined the factors in different settings (urban and rural); the findings would help as an input for policy makers and health planners in the area to respond to the fertility preferences of the population while simultaneously improving maternal health, slowing the rate of population growth, and contributing to achievement of national goals. Therefore, this study tried to determine the prevalence and identify the key socio-demographic determinants of unmet need for FP in the district.

II. Methods

a) Study area and period

The study was conducted in Enemay district, northwest Ethiopia, from 20th March to 10th April 2013.

b) Study Design

A community-based comparative cross-sectional study was carried out to determine the prevalence and identify the key socio-demographic determinants of unmet need for FP services.

c) Study Population

The source population constituted all married women in the reproductive age and married women in the selected *kebeles* were the study population.

d) Sample size determination

Table 1 : Assumptions for sample size calculation, Enemay district, Northwest Ethiopia, 2013

Character	Value
Significance Level (alpha)	5% two sided
Power (% chance of detecting)	80%
Proportion of unmet need for family planning for urban	27.5%
Proportion of unmet need for family planning for rural	15%
Relative Sample Sizes Required (Rural / Urban)	1.0
Design effect	2
Non-response rate	5%

The sample size was determined based on double population proportion according to the assumptions in the above table (Table 1).

The proportion of unmet need for FP among currently married women 15% and 27.5% for urban and rural respectively was taken from EDHS 2011 (ICF International, 2012).

The sample size was calculated using Epi Info sample size calculator for cross-sectional study. With consideration of design effect of 2 and non-response rate of 5%, the total sample size was 770.

e) Sampling method and procedures

Multi-stage sampling followed by systematic random sampling method was employed; five out of the 25 rural *kebeles* and three urban *kebeles* were selected to represent the rural and urban residents by using lottery method respectively. The peri-urban *kebeles* of the district were excluded from the study to avoid mixing of urban and rural populations. The sample size for both rural and urban areas was allocated proportionally; systematic random sampling technique was used to reach the study units (households). Women of reproductive age who were living with their husband were included in the study.

f) Variables of the Study

Dependent variable:

- Unmet need for family planning services

Independent variables:

- Demographic and socio-economic characteristics
- Health facility related characteristics
- Client characteristics

g) Data collection procedures

Data were collected using semi-structured questionnaires adapted by reviewing literatures and suited to the local situation [31, 36, 39]. The questionnaire was prepared first in English and was

translated to Amharic (local) version and the local version was used to collect the data.

The data were collected by 12 trained diploma nurses and was supervised by 3 BSc nurses. During data collection, if there were more than one eligible woman in households, one woman was selected randomly; where there was no an eligible woman in the sampled households, the next household was visited and in case it was closed revisit were done.

h) Data quality control

In order to maintain quality of data, data collectors and supervisors ware trained and questionnaire guide was prepared. Pre-test was done on 5% of the total sample and based on the findings of the pre test the questions were modified. The collected data were checked for completeness and consistency by the principal investigator and supervisors and were communicated to data collectors. Moreover, double data entry was performed to 10% of the data to check for consistency.

i) Data processing and analysis

The collected data were cleaned and fed to Epi Data version 3.1 and analysis was done by using SPSS version 16 statistical software. Variables with p-value of less than 0.2 in bivariate analyses were entered for multivariable logistic regressions to analyze the associated factors for unmet need for family planning. Standard deviations, odds ratios and 95% confidence intervals with p-value less than 0.05 as statistical significant were used for data presentation.

j) Definitions

Unmet need for FP *:* The number or percent of women currently married (in union) who are fecund and who desire to either terminate (do not want anymore) or postpone (at least 2 years) childbearing, but who are not currently using a contraceptive method [8].

Kebele : The lowest government administrative hierarchy.

k) Ethical Considerations

Ethical clearance was obtained from the ethical committee of Debremarkos University. The study participants were informed about the objective, rationale and expected outcomes of the study and oral consent was obtained either to participate or refuse for the interview.

III. Results

a) Demographic and socio-economic characteristics of the study subjects

Table 2 : Socio-demographic and socio-economic characteristics of married women by place of residence in Enemay district, Northwest Ethiopia, 2013

Characteristics	Urban		Rural		Total	
	N	%	N	%	N	%
Age						
15-19	9	2.4	31	8.2	40	5.3
20-24	60	16.0	52	13.7	112	14.8
25-29	84	22.3	76	20.1	160	21.2
30-34	108	28.7	98	25.9	206	27.3
35-39	75	19.9	55	14.5	130	17.2
>=40	40	10.6	67	17.7	107	14.2
Religion						
Orthodox	315	83.8	367	96.8	694	91.9
Muslim	51	13.6	7	1.8	51	6.8
Protestant	10	2.7	5	1.3	10	1.3
Educational status of respondent						
No formal education	231	61.4	312	82.3	543	71.9
Primary education	66	17.6	52	13.7	118	15.6
Secondary and above	79	21.0	15	4.0	94	12.5
Educational status of husband						
No formal education	145	38.6	270	71.2	415	55.0
primary education	105	27.9	77	20.3	182	24.1
Secondary and above	119	31.6	30	7.9	149	19.7
Don't know	7	1.9	2	.5	9	1.2
Occupational status of respondents						
House wife/farmer	330	87.8	371	97.9	701	92.85
governmental and nongovernmental employee	46	12.2	8	2.1	54	7.15

Monthly income						
<600	58	15.4	76	20.1	134	17.7
600-1044	94	25.0	149	39.3	243	32.2
1045-1599	99	26.3	85	22.4	184	24.4
>=1600	125	33.2	69	18.2	194	25.7
Age at first marriage						
<18	263	69.9	318	83.9	581	77.0
>=18	113	30.1	61	16.1	174	23.0
Desired number of children (n = 755)						
<5	297	79.0	288	76.0	585	77.5
>=5	79	21.0	91	24.0	170	22.5
Number of total alive children (n= 666)						
<5	274	81.3	242	73.6	516	77.5
>=5	63	18.7	87	26.4	150	22.5
Have experienced in child death (n = 666)						
Yes	57	16.9	59	17.9	116	17.4
No	280	83.1	270	82.1	550	82.6
Media exposure						
Yes	228	60.6	153	40.4	381	50.5
No	148	39.4	226	59.6	374	49.5

A total of 755 (98.1%) married women had responded for the interviews. Three hundred seventy six (49.8%) were from urban and 379 (50.2%) were from rural areas of the district.

The mean ages were 30.6 (SD ± 6.56) and 30.7 (SD ±7.75) for urban and rural respondents respectively. The mean ages of the respondents at first marriage and first pregnancy were 16.58 (SD± 2.68) and 18.71 (SD± 3.19) respectively. Based on quartile classification, 134 (17.7 %) of households had monthly income of less than 600 ETB and 243 (32.25%) between 600- 1044 ETB monthly income (Table 2).

b) Client-related characteristics of study subjects

Table 3 : Frequency distribution of client-related characteristics in Enemay district, Northwest Ethiopia, 2013

Characteristics	Urban		Rural		Total	
	N	%	N	%	N	%
Have you ever been pregnant						
Yes	344	91.5	337	88.9	681	90.2
No	32	8.5	42	11.1	74	9.8
Have you ever given birth to a child (n=681)						
Yes	337	98.0	329	97.6	666	97.8
No	7	2.0	8	2.4	15	2.2
Are you currently menstruating						
Yes	226	60.1	211	55.7	437	57.9
No	150	39.9	168	44.3	318	42.1
Have you ever heard about FP						
Yes	375	99.7	374	98.7	745	98.7
No	1	0.3	5	1.3	10	1.3
Knowledge of FP methods						
Yes	358	95.2	361	95.3	719	95.2
No	18	4.8	18	4.7	36	4.8

Most, 344 (91.5%), of the urban and 337 (88.9%) of the rural study subjects had pregnancy history and of which 666 (97.8%) had given birth. Regarding family planning information, 375 (99.7%) of urban and 374 (98.7%) of rural respondents heard about FP methods and 358 (95.2%) of urban and 361 (95.3%) of rural respondents knew at least one FP method respectively (Table 3).

c) Facility related characteristics of study subjects

Table 4 : Frequency distribution of facility related characteristics of married women in Enemay district, Northwest Ethiopia, 2013

Characteristics	Urban		Rural		Total	
	N	%	N	%	N	%
Place to access FP services (n= 520)						
Hospital	1	0.4	2	0.8	3	0.6
Health center	188	71.2	138	53.9	326	62.7
Health post	64	24.2	107	41.8	171	32.9
Private clinic	5	1.9	3	1.2	8	1.5
Drugstore	6	2.3	6	2.3	12	2.3
Time taken for round trip from the source of FP services (n=752)						
< 60 minutes	325	86.4	292	77.0	617	82.0
>= 60 minutes	51	13.6	87	23.0	135	18.0
Ever told FP methods						
Yes	231	61.4	245	64.6	476	63.0
No	145	38.6	134	35.4	279	37.0
Visited by a community based health agents in the last 12 months						
Yes	211	56.1	226	59.6	437	57.9
No	165	43.9	153	40.4	318	42.1

Majority 326 (62.7%) of the study subject got FP services from health centers followed by health posts 171 (32.9%). On the other hand, majority 617 (82.0%) of the respondents took less than an hour for round trip to get FP services. About 476 (63.0 %) of respondents ever discussed about FP services with healthcare providers and 437 (57.9%) visited by healthcare providers within the last 12 months prior to this study (Table 4).

d) Sources of information about FP methods

Two hundred fifty four (33.5%) of urban and 307 (63.7%) of rural married women got information about FP methods form health extension workers. No one of the rural respondents got information from television while 119 (15.7%) of the urban respondents got the information from television.

e) Reasons for not-use of FP methods

Out of 755 married women, 520 (68.9%) were current users of FP methods; of these, 369 (48.9%) were using for spacing and 151 (20%) for limiting. The contraceptive prevalence rates for urban and rural residents were 266 (70.7%) and 254 (67%) respectively. The main reasons for not using FP methods for both urban and rural residents were health concern and fear of side effects 74 (38.34%), less perceived risk of pregnancy 51 (26.42%), opposition from partners 18 (9.33%), religious prohibition 17 (8.81%), familial opposition 17 (8.81%), ambivalence to plan when to get pregnant 15 (7.77%) and availability of preferred methods 8 (4.15%). The main reasons for not using FP methods for 29 (31.5%) urban and 45 (41.7%) rural study subjects were health concerns and fear of side effects followed by less perceived risk of pregnancy 25 (27.2%) and 26 (24.1%) for urban women and rural respectively.

f) Unmet need for family planning

The overall unmet need for FP was 193 (25.6) of which 119 (15.8) was for spacing and 74 (9.8) for limiting (Figure 1).

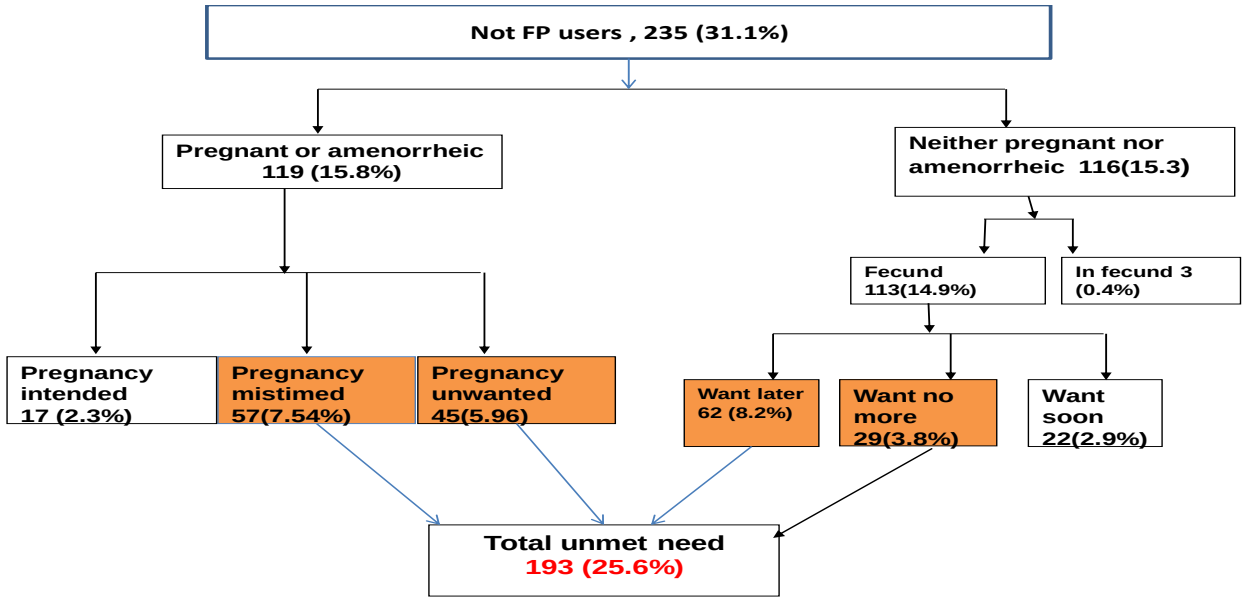

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Figure 1 : Illustration of calculated unmet need for family planning in Enemay district, Northwest Ethiopia, 2013

g) Factors associated to unmet need for family planning (urban)

Table 5 : The association of socio-demographic and other characteristics of married women with current status of unmet need for FP in the urban area of Enemay district, 2013

Variables	Unmet need for FP		COR (95% C.I)	AOR (95% C.I)	P-value (Overall)
	Yes	No			
Age of respondents					
15-19	3	6	3.1(1.28, 12.027)*	1.580(0.916, 2.314)	
20-24	11	49	1.891(1.014, 11.345)*	1.247(0.442, 10.462)	
25-29	12	72	1.03(0.342, 12.431)	1.621(0.239,11.860)	0.049
30-34	15	93	1.00	1.00	
35-39	14	61	1.423(0.208, 10.282)	1.094(0.708, 2.452)	
>=40	14	26	3.34(2.701, 11.319)*	2.605(1.105, 4.003)*	
Age at first marriage					
<18	62	194	1.00	1.00	
>=18	7	113	0.193 (0.229, 0.433)*	0.390 (0.282, 0.649)*	0.001
Educational status of respondent					
No formal education	58	172	1.00	1.00	
Primary education	9	56	0.491 (0.477, 0.825)*	0.145 (0.134, 1.479)	
secondary and above	2	79	0.082 (0.075, 0.420)*	0.201 (0.130, 0.213)*	0.001
Educational status of husband					
No formal education	28	117	1.00	1.00	
Primary education	12	93	0.671 (0.539, 0.935)*	0.078 (0.037, 3.134)	
Secondary and above	28	91	0.308 (0.201, 0.470)*	0.231 (0.144, 0.295)*	< 0.001
Do not know	1	6	0.696 (0.420, 1.384)	0.294 (0.281, 2.881)	
Occupational status of respondents					
House wife/ farmer	233	55	1.00	1.00	
Government employee	6	25	0.057 (0.018, 0.585)*	0. 239 (0. 232, 0.411)*	0.027
Merchant/other private work	8	49	0.041 (0.027, 0.345)*	0.200 (0.128, 2.300)	
Visited by a healthcare providers in the last 12 months					
Yes	31	180	1.00	1.00	
No	38	127	1.737 (1.014, 8.279)	2.630 (1.452, 6.926)*	0.048
Partner attitude towards FP use					
Approve	32	238	1.00	1.00	

Disapprove	36	17	3.494 (2.652,8.407)*	2.080 (1.460, 9.408)*	0.036
Neutral	20	33	0.222 (0.103, 1.056)	0.481 (0.225, 2.716)	
Discussion with partner about FP					
Yes	22	197	0.261 (0.152, 0.917)*	0.233 (0.231, 2.328)	0.057
No	47	110	1.00	1.00	
Preplanned number of children (before first pregnancy)					
Decided	32	148	1.00	1.00	0.004
Did not decided	37	156	1.097 (1.013, 4.34)*	1.871 (1.208, 6.147)*	

* Significant at p-value <0.05

Bivariate and multivariate logistic regression analysis of possible explanatory variables over unmet need for FP was carried out. While controlling for possible confounders, the age group of 40 and above were 2.605 (AOR=2.605, 95%CI: 1.105-4.003) times more likely to have unmet need for FP compared to age groups of 30-34 years. Women with age at first marriage at 18 and above and government and non-government employees were less likely to have unmet need for FP when compared to marital age less than 18 and housewife/farmer with (AOR=0.282, 95%CI: 0.139-0.649) and (AOR=0.239; 95% CI: 0.232-0.411) respectively.

Women and their partners with educational level of secondary and above (AOR=0.201; 95%CI: 0.13-0.213) and (AOR=0.231, 95%CI: 0.144-0.295) respectively were also less likely to have unmet need for FP when compared to with no formal education.

Married women who had not been visited by healthcare providers within the last 12 months prior to the study were 2.63 times more likely to have unmet need for FP compared to women who had been visited (AOR=2.630, 95%CI: 1.452-6.926). Moreover, married women whose partners did not support the use of FP methods were 2.08 times more likely to have unmet need compared to those whose partners support FP use (AOR=2.08, 95%CI: 1.46-9.408).

On the other hand, married women who had not decided their total number of children before their first pregnancy were 1.871 (AOR=1.871, 95%CI: 1.208-6.147) times more likely to have unmet need for FP than their counter parts.

h) Factors associated to unmet need for family planning (rural)

Table 6 : The association of socio-demographic and other characteristics of married women with current status of unmet need for FP in the rural area of Enemay district, Northwest Ethiopia 2013

Explanatory Variables	Unmet need for FP		COR (95 % C.I)	AOR (95 % C.I)	P-value (overall)
	Yes	No			
Age of respondents					
15-19	13	18	3.00(1.411, 14.247)*	2.357 (1.689, 5.691)*	<0.001
20-24	11	41	0.869 (0.757, 1.840)	2.630 (1.347, 8.262)*	
25-29	28	48	2.425(1.326, 10.609)	2.018 (1.525, 4.820)*	
30-34	19	79	1.00	1.00	
35-39	24	31	0.774 (0.454, 1.319)	0.243 (0.046, 1.278)	
>=40	29	38	0.763 (0.471, 1.237)	0.207 (0.040, 1.082)	
Age at first marriage					
<18	104	204	1.00	1.00	0.003
>=18	20	51	0.769 (0.537, 0.984)*	0.260 (0.189, 0.368)*	
Educational status of respondent					
No formal education	107	205	1.00	1.00	<0.001
Primary education	13	39	0.639 (0.478, 0.980)*	0.355 (0.280, 0.831)*	
secondary and above	4	11	0.697 (0.519, 0.871)	0.324 (0.053, 0.999)*	
Educational status of husband					
No formal education	191	79	1.00	1.00	0.01
Primary education	26	51	0.210 (0.108, 0.618)*	1.780 (0.833, 3.804)	
Secondary and above	18	12	0.620 (0.435, 0.804)	0.428 (0.319, 0.895)*	
Don't know	1	1	1.000 (0.063, 15.988)	9.477 (0.230, 30.221)	
Ever discussed about FP methods with healthcare providers					0.033

Yes	67	178	0.508 (0.284, 0.926)*	0.245 (0.224, 0.808)*	
No	57	77	1.00	1.00	
Are you menstruating					
Yes	53	158	0.506 (0.439, 0.816)*	0.3619 (0.209, 0.696)*	< 0.001
No	67	101	1.00	1.00	
Partner attitude towards FP use					
Approve	69	192	1.00	1.00	0.006
Disapprove	35	30	1.925 (1.760, 10.051)	3.732 (1.293, 4.770)*	
Neutral	20	33	0.593 (0.348, 1.056)	0.375 (0.254, 4.086)	
Discussion with partner about FP					
Yes	40	138	0.404 (0.138, 0.819)*	0.250 (0.225, 2.205)	0.510
No	84	117	1.00	1.00	
Desired number of children					
Decided	49	89	0.388 (0.248 , 0.780)*	0. 724 (0. 343 , 2.494)	0.184
Didn't decided	164	74	1.00	1.00	

* Significant at p-value <0.05

As age increased, the level of unmet need was decreased and age groups of married women 15-19, 20-24 and 25-29 were positively and significantly associated to unmet need for FP when compared to age group 34-39 with (AOR=2.357, 95%CI: 1.689-5.691), (AOR=2.630, 95%CI: 1.347-8.262) and (AOR=2.018, 95%CI: 1.525-4.820) respectively.

Age at first marriage 18 and above was negatively and significantly associated to unmet need for FP compared to marital age of less than 18 (AOR=0.260, 95%CI: 0.189-0.368). On the other hand, primary as well as secondary and above educational level of married women were negatively and significantly associated to unmet need for FP when compared to no formal education (AOR=0.355, 95%CI: 0.280-0.831) and (AOR=0.324, 95%CI: 0.053-0.999) respectively. Moreover, married women whose husbands' educational levels of secondary and above were less likely to have unmet need for FP compared to those whose partners had no education (AOR=0.428, 95%CI: 0.319-0.895).

Married women who had ever discussed about FP issues with healthcare providers were also less likely to have unmet need for FP than their counterparts. Currently menstruating was significant predicting factor for unmet need for FP (AOR=0.3619, 95%CI: 0.209-0.696). On the other hand, married women whose partners do not support the use of FP methods were 3.73 times more likely to have unmet need for FP services compared to those whose partners support FP use (AOR=3.73, 95%CI: 1.293-4.770) (Table 7).

IV. Discussion

The prevalence of unmet need for FP services was 25.6%, which is comparable to the national prevalence (25.3%) and is slightly higher than in eastern Nepal (21.7%) and in Amhara region, Ethiopia (22.1%) (ICF International, 2012; Sellen D., 2012); this figure is lower than the prevalences Endersa, Tigray region (48%), Butajira (52.4%), Belesa (39.5%) and Kobo (47.3%) (Assefa H, 2011; Ghebreselasie R, 2006; Awang N. L, 2011). These variations might be attributed to the expanding health services coverage and increased awareness of FP and maternal health services. In most parts of Ethiopia, rural esidents are usually of low education and socioeconomic status and have limited access to FP services. This study also revealed that the prevalence of unmet need for FP in urban and rural areas were 18.4% and 32.7% respectively; the discrepancy was wider than the national figure which was 15% and 27.5% (ICF International, 2012). Higher unmet need in rural areas might reflect limited awareness and acceptability of FP services in rural areas.

About two-third married women were FP method users; this is higher than in Kobo, northern Ethiopia (38%) (Choudhary S, 2011); the variation might be due to increased awareness on FP.

Women who married before their 18 birth anniversary were more likely to have unmet need in both areas. This might show awareness of legal marriage in the rural area was inadequate and on the other hand women who marry at their 18 and above were able to plan and manage their family size because they had more exposure to FP methods and were mature enough to do so.

Only 26% of urban and 18.3% of rural respondents had discussed about family planning issues with their partners. This was lower than a study from Belesa, north Gondar that revealed around 45% of wives had experiences of FP discussion with partners (Mihret N, 2008). The possible reason for this difference might be inadequate behavioral change communication in the area.

As the educational status of women improves they would have more awareness about the FP services and hence unmet need decreases. These findings were supported by the Demographic and Health Survey analysis of Kenya which indicates better educated

women – secondary level or higher have considerably less unmet need (17%) than women with little or no education (26%) [38]. Husband educational level secondary and above was also negatively associated with unmet need for FP in both urban and rural residents; a study in Butajira district revealed a similar pattern (Mekonnen W. and Worku A, 2011).

The main reasons for not using FP methods for both urban and rural residents were health concerns and fear of side effects, less perceived risk of pregnancy, religious prohibition, familial opposition and ambivalence to plan when to get pregnancy; these findings were supported by the findings of a studies done in Nigeria and Iraq (Laya K.S, 2012).

Discussion with health care providers about FP issues was negatively and significantly associated to unmet need for FP, this is in line with studies done in Kobo, Northern Ethiopia Awang N. L, 2011) and Nigeria (Laya K.S, 2012). Menstrual status of married women was significantly associated to unmet need for FP in the rural area but not in urban area; this might be due to their misperception of less likely to become pregnant in the absence of menstruation.

The overall prevalence of unmet need for FP was high; age at first marriage, educational status of respondents and partners and partner attitude towards FP use were independent predictors of unmet need for FP in both urban and rural areas.

Moreover, desired number of children, healthcare providers visit, age of respondent, menstrual status and discussion about FP were the main predicting factors of unmet need for FP.

The local government should strive to create awareness and implement the legal age for marriage so as to increase marital age at least to 18 years and above to contribute for the decrement of unmet need for FP.

Health extension workers should strengthen the visiting and awareness creation of women and their partners towards the importance of FP services utilization; education for women should be scaled up.

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"Role of Twice Weekly HDR- Brachytherapy in Management of Carcinoma Of Uterine Cervix-Experience of Rural Centre in India"

By Sanjay Singh Chandel, KK Singh, AK Nigam & Rajesh Singh Baghel
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Abstract - Aim and Objective : Study of safety and efficacy of twice weekly HDR brachytherapy, in management of cervical carcinoma.

Background and purpose : HDR brachytherapy (HDR-ICBT) is integral part of treatment in cervical cancer treated with curative intent.HDRICBT should always fractionated, if brchytherapy started after external radiotherapy and once in a week application was done then there is prolongation of overall treatment time (OTT) which leads to of tumour repopulation leading to poor tumour control. To reduce repopulation, OTT should be shortened either by increasing dose per fraction or administering more fractions per week, first approach has more complications. So to decreases OTT twice weekly regimen should be prefer. This study aims to evaluate the effectiveness and safety of twice weekly HDR-ICBT

Materials and Methods : Hundred patients with locally advanced (stages IIB to IVA according to FIGO classification) carcinoma of uterine cervix were enrolled, radiotherapy was conventionally administered: 50.4 Gy/28 fractions by external beam (whole pelvis) followed by HDR-ICBT, 4 fractions of 7 Gy each. Paclitaxel was administered on weekly basis at dose of 40 mg/m^2 during entire course of external beam radiotherapy as a radio sensitizer. Overall treatment time 50 days.

Keywords : *twice weekly HDR brachytherapy, paclitaxel, cervical carcinoma.*

GJMR-K Classification : *NLMC Code: WN 250.5.B7, WP 460*

Strictly as per the compliance and regulations of:

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Results : Treatment response was evaluated three months after the end of radiotherapy by means of clinical examination and ultrasonography. Complete Regression (CR) in 83%, partial response (PR) 14% and progressive disease 3%. At 26 months of median follow up 73 patients alive, 58 patients are disease free.

Conclusion : The twice weekly HDRICBT regimen may improve the local control rate with low complications as well as reduced overall treatment time.

Keywords : twice weekly HDR brachytherapy, paclitaxel, cervical carcinoma.

I. Introduction

Invasive cervical cancer is the second most common malignancy in the women worldwide, after breast cancer, this accounts nearly 5,00,000 new cases and 250000 death per year [1] Of these, 80% occur in developing countries and 20% in developed countries[2]. The incidence rate in India among various cancer registries shows 17.2 to 30.7 per 100,000 women with highest incidence in Chennai, Brashi and lowest Incidence in Mumbai (NCRP 2001). The number of cervical cancer deaths in India is projected to increase 79000 by the Year 2010. In our department cancer cervix constitutes 25% of total cases seen.

Whereas, either radiotherapy (RT) (external RT+ Brachytherapy) or surgery represents the mainstay of treatment for patients with early stage cancer, while multimodality treatment strategies, including RT combine with cisplatin based chemotherapy (CT) or neoadjuvant chemotherapy or CT followed by radical surgery have been reported to improve disease free as well as overall survival. Concurrent chemoradiation (CCRT) is established treatment modality in locally advanced cervical cancer. Brachytherapy has important role in management of cervical carcinoma, either alone in early cases or in combination with external RT. LDR brachytherapy is gold standard but due to potential disadvantage of LDR like radiation exposure to staff, long treatment time hence possibility of applicator displacement etc. so LDR is replaced by HDR, but HDR treatment is always fractionated, if brachytherapy started after completion of EBRT, due to large bulky tumour and, if once weekly application was done than possibility of treatment prolongation and tumour repopulation so there is need of twice weekly HDR brachytherapy.

In locally advanced cervical cancer, many phase I and II studied, paclitaxel alone or in combination with cisplatin, carboplatin in patients undergoing pelvic radiation therapy. This acts as radiosensitizer and synergistic action along with radiotherapy. [3][4]

Traditional prognostic factors in cervical cancer have been studied. Patients related prognostic factors include age, anaemia and smoking.[5][6][7]and[8] Tumour related factors includes stage, tumour size, nodal involvement, and hypoxia [9]. Radiation related factors include overall treatment time, dose, use of brachytherapy and concurrent chemotherapy. Shorter treatment times, higher doses, use of brachytherapy, and use of chemotherapy are all associated with better outcomes.[10],[11].[12],[13]

CCRT is the established treatment modality in locally advanced carcinoma of uterine cervix. Many drugs like cisplstin, 5-fluorouracil and more recently paclitaxel are used as radiosensitizer. In addition to direct cytotoxic effect shows the theoretical advantage to sensitize malignant tissue to the effect of radiation. CT in facts may act synergisticacally with RT and inhibiting

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the repair of sub lethal damage along with promoting the synchronization of cells into a radiation sensitive phase of the cycle, and reducing the fraction of hypoxic cells resistant to radiation. Furthermore CT may independently increase the rate of death of tumor cells.
In rural centre cervical cancer is leading malignancy and majority of patients presented with locally advanced staged. This prospective non randomized study with 100 patients of locally advanced cervical carcinoma was conducted to evaluate the adverse effect of treatment prolongation treated with radical radiotherapy. This is the preliminary reports of our experience at a median follow up of 26 months.

II. Materials and Methods

During a period from July 2007 to June 2010, 100 patients of cervical carcinoma attending the department of Radiotherapy were included in prospective non randomized trials of CCRT.

a) Eligibility Criteria Were

- No previous oncology treatment except biopsy.
- Histological/cytological diagnosis of malignant disease.
- Age between 28-65years.
- HB >l0gm.
- Blood urea &creatinine not higher than twice normal value.
- ECOG performance scale score of 0-2.
- Informed consent oral and written from patients.
- ANC >2000, platelets >100000, bilirubin <1.5, serum creatnine, 1.5mg%.
- SGOT or SGPT <2 upper normal, creatinine clearance 50ml/min.
- No clinically significant medical problem like heart disease.
- No prior radiation therapy. Patients characteristic are shows in [Table no.1]

b) Pretreatment Evaluation

- Detailed history and complete physical examination including bimanual pelvic examinations.
- Radiographic studies like X- ray pelvis, X-rays chest, USG abdomen and pelvis, if possible CT scan and MRI of pelvis also done.
- Laboratory studies including routine investigation like Hemoglobin estimation, total leukocyte count; differential count and platelet count; blood sugar and liver functions test, biochemical analysis.
- Clinical staging based on FIGO staging.

c) Treatment Designed

The treatment protocol schedule consisted of a course of RT combined with concomitant paclitaxel administered weekly during entire course of external RT.

d) Chemotherapy

Paclitaxel a dose of 40mg/m^2 was diluted in 100 ml of normal saline and administered by 30 minute infusion. Dexona 8 mg, Ranitidine 50 mg and Ondensetron 8 mg IV bolus, given 30 min before paclitaxel.

III. Radiotherapy

All patients received RT to whole pelvis 50.4Gy/ 28 fractions, one fraction per day, five days per week, with two opposed pelvic field A-P and P-A and four fields. Two fields technique were planned when inter portal distance (IPD) less than 20 cm. and four fields, when IPD was more than 20 cm. Last three fractions delivered using midline shielding, followed by HDRICBT 4 fractions of 7 Gy each (total 28Gy) to reference point A (2 cm superior and 2 cm lateral to the cervical Os) on twice weekly basis. Total dose to point A was 8360 cGy. Overall treatment time (OTT) was 50 days (range 49 to 52 days).

IV. Evaluation of Follow-up

Before each course of CT patients were evaluated and during RT they were seen weekly by Radiation oncologist for normal tissue reaction and tumor response. Routine investigations were performed and if required supportive management was given. As per RTOG criteria adverse reaction was documented. During CT all patients were admitted in ward. All patients were examined after completion RT than 6 weeks followed by 3 monthly intervals. Blood count, x-ray chest, USG abdomen. Patients belong to rural area were also motivated to come for regular follow-up.

V. Response

After completion of treatment, all patients were evaluated for response and acute toxicity. Response was evaluated three months after the end of radiotherapy by means of clinical examination and USG. Complete regression (CR) was defined as disappearance of the disease according to both clinical and radiological examination. Partial regression (PR) was defined as tumor size regression more than 50%. A regression of less than 50% or stable disease (SD) was defined as no change (NC). Acute hematological toxicity was monitored weekly during treatment through serum examination and blood cell counts. Patient symptoms like diarrhoea, vomiting, dysuria were reported. Toxicity was scored according to WHO criteria.

VI. Results

All patients completed planned course of RT. Complete Regression in 83 patients (83%), partial response in 14 patients (14%), while three patients had progressive disease (3%) stage wise response shown in[Table no.2]. Severe adverse effects during treatment-

are mention in [Table No.3]. Late radiation reactions mention in [Table No. 4]. While response of treatment with OTT less than 50 days verses more than 50 days mention in [Table no. 5] After two years from last patents treated analysis done, only 73 patients on regular follow up, overall survival and disease free survival mention in [Table no.6], eight patients have locoreginal recurrences, three patients have liver metastasis, one patient have liver and lung metastasis, two patients have bone metastasis. One patient has supraclavicular lymphadenopathy. Eight patients died during follow up and rest patients missed for follow up. Vaginal fibrosis developed in almost every patent, one patients developed rectovaginal fistula, two patients developed gross haematuria and eight patients developed rectal bleeding. Rectal bleeding cases were managed with steroid enema. Heamaturea cases were managed with symptomatically. Other recurrence cases were managed with either palliative radiotherapy or chemotherapy (cisplatinum& paclitaxel based)

Our study is in preliminary stage only 26 months follow-up done, long term follow-up is needed to derive response of treatment, recurrences and late complications. No cases of cardiac toxicity and alopecia were recorded.

VII. Discussion

Definitive RT represents the standard treatment for locally advanced (FIGO stage IIB-IVA) cervical carcinoma. RT is usually performed applying whole pelvic fields with a dose up to 50 Gy followed by boost with ICBT. Despite large tumor doses conventionally administered (65 Gy or more), failures are not uncommon. According to Perez [14] the actuarial highest probability of loco regional control after RT alone is 60% for stage III. On the other hand, achieving local CR after RT represent an important predictive factor of survival, being a 5 years survival rate of 76% when local CR is obtained, versus 41% when CR is not achieved.[15]The improvement of pelvic control cannot be reached by increasing radiation dose beyond the current levels without prohibitive morbidity. The consequences, in recent years, have been the development of chemo-radiotherapy regimens with which favorable results have been reported.

In locally advanced cervical carcinoma CCRT with cisplatin or cisplatin in combination with fluorouracil to external and ICBT improved the survival rate [16], [17] and[18]Paclitxel was also used along with RT either alone or in combination with cisplatin or carboplatin by many workers[19],[20]and[21] shows that paclitaxel either alone or in combination with other agent act as radiosensitizer with good pelvic control. In our study shows that concurrent administration of paclitaxel at the weekly dose of 40 mg/m^2 and RT with conventional fractionation is feasible. The acute toxicity is not increased in respect to what is commonly observed during a conventional course of exclusive radiation treatment. A complete response of 83% considered as satisfactory results.

Over all treatment time (OTT) is one of most important prognostic factor, [11]. reported that there is loss of pelvic failure rate approximately 1% loss of tumor control per day of prolongation of treatment time beyond 30 days in 830 patients with cervical carcinoma treated with irradiation alone.Petereit et al[12] reported that the five year survival and pelvic control rate differed significantly with treatment time <55 days vs. >55 days: 65 and 54% (p= 0.03), 87 and 72% (p= 0.006), respectively. In addition, survival was decreased by 0.6% per day and pelvic control by 0.7% per days for all stages.

Delaloyeet.al. [22] and Lanciano et.al. [10] Suggested that shorter treatment duration is a factor associated with longer survival and pelvic control in carcinoma cervix, OTT less than or equal to 55 days. In order to shorten OTT, brachytherapy could perform at or near the end of EBRT.

MandalAbhijit et al. (2007):[23]Study found that stage II patients showed comparable local control rate (75% vs. 79%) and 5-year disease free survival rate (73.3% vs.76.3%) with OTT <50 days and OTT >50 days respectively, but stage III patients showed a statically significant (P<0.001) higher local control rate (100% vs. 76.5%) and 5-year disease free survival rate (100% vs. 68.6%) with OTT <50 days and OTT >50 days respectively.

In our study it was found that there was a strong correlation between OTT and local control, stage IIB patients showed local control rate (100% vs. 83.3%), stage IIIB patients showed comparable local control rate (82.6% vs. 88.2%) and stage IVA patients local control rate (72.7% vs. 0. %). with OTT≤50 days and OTT >50 days respectively. Patients who completed treatment ≤50 days as compare to >50 days shows statistically significant local control (p<0.05), in different stages.

Yukihiro Hama et al. [24]have been studied effectiveness and safety of twice-weekly HDRICBT in cervical carcinoma, showed that twice-weekly regimen substantially improve local control (p<.01) and reduced moderate and severe complications (p <.01). However, despite improvements in local control and severe complications, overall survival was not significantly improved, because 93% of patients who developed local-regional recurrences had also distant metastasis, and most of death occurs due to metastasis and multiorgan failure.

ABS recommendation for HDRICBT[25]: The overall treatment time would be unduly prolonged if the HDR was started after completion of EBRT as a weekly session. If disease is advanced due to large tumor volume, brachytherapy implant was not possible during EBRT. So it is advisable to perform two implants per

week after the EBRT has been completed.To reduce repopulation, OTT should be shortened either by increasing dose per fraction or administering more fractions per week. If the number of fractions increased from one to two a week, the dose per fraction to point A reduced. In our study number of fractions increased but dose per fraction was not reduced, because we started brachytherapy after completion of EBRT. 7 Gy per fraction twice weekly regimen was well tolerated with fewer complications and good local control.

In our study OTT was 49-52 days (median 50days). In our study to decreases OTT, brachytherapy started after completion of EBRT and two implants per week were done. Result shows that twice weekly HDR brachytherapy seems to be safer and better therapeutic outcome with improve local control rate. As per our knowledge this is the only study where 7Gy per fractions on twice weekly basis with acceptable complications.

However some drawback was also present in this study.

1. It was not randomized.
2. Number of patient in less.
3. Study period in short.
4. Follow up is poor.
5. Cause of death of patient is not known.

This study indicates that for better tumour control OTT should be less than 50 days, to decrease OTT, brachytherapy given on twice weekly basis, twice weekly brachytherapy seems to be safer and better therapeutic outcome with improve local control rate.courses of paclitaxel can be given as CCRT with manageable adverse effect in the management of locally advanced cervical carcinoma.

However a large randomized study is needed to pin point if any. CT and RT controlled only tumor and tumor related death. It cannot improve the expected age; hence cause of death in every treated cancer patients should be evaluated.

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Table 1 : Patient's Characteristics

Total No. of Patient	100	
Follow up (Median, Range)	26 Months (21to 46)	
Stage IIB	24	
Stage IIIB	62	
Stage IVA	14	
Age (Median, Range)	47.8 Years (28 to 65)	
Resident	Rural	70
	Urban	30
Degree of differentiations (SCC)	Moderately	48
	Well	28
	Poorly	24

SCC squmous cell carcinoma

Table 2 : Over all response after completion of treatment

Response	IIB	IIIB	IVA	Total
CR	21	51	11	83
PR	2	9	3	14
SD	1	2	0	3
Total	24	62	14	100

CR- complete response, PR- partial response, SD- stable disease

Table 3 : Acute Reactions

Acute Reactions	Grade-0	I	II	III	IV
Neutropaenia	84	13	3	0	0
Thrombocytopenia	88	8	4	0	0
Hypersensivity reaction	92	6	2	0	0
Nausea	20	38	52	10	0
Vomiting	26	52	22	0	0
Diarrohea	13	61	20	6	0
Urinary symptoms	40	54	6	0	0
Rectal symptoms	46	38	14	2	0

Table 4 : Late Reactions

Late Reactions	No. of cases
Vaginal fibrosis	24
Rectovaginal fistula	1
Bleeding per rectal	8
Hematurea	2

Table 5 : Comparison of Response between OTT ≤50 days vs. >50 days

Completed treatment ≤50 days				Completed treatment >50 days		
Stage	CR	Total no. of patients	%	CR	Total no. of patients	%
IIB	17	17	100	10	12	83.3
IIIB	19	23	82.6	30	34	88.2
IVA	8	11	72.7	0	3	0

CR- complete response, OTT- overall treatment time

Table 6 : Follow-up after 2 years

Response	Percentage
Follow-up	73
DFS	58

DFS- disease free survival

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19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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