

Original Research Article

Maternal tobacco use and risk for congenital anomalies

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ABSTRACT

Background: Over a period of decades non genetic causes are controlled and mortality and morbidity is considerable reduced due to malformation. Although 50% of causes for malformation are unknown origin, but, with primary prevention 50% of birth defects could be prevented. Research for finding the risk factors are continuous and such results would help to implement preventive strategies to improve maternal and child health.

Methods: This is cross sectional; hospital based study, conducted in Krishna Hospital Karad, included all the Pregnant Mother diagnosed to have congenital birth defected foetus through antenatal examinations, delivered baby with diagnoses of congenital malformation, who were admitted at tertiary care hospital Karad.

Results: Total 283 cases were diagnosed with birth defects. Parent's history for tobacco use states that 16 (5.7%) mothers and 149 (53%) of fathers of malformed babies used tobacco. Among these 16 (5%) tobacco user mothers, maximum babies 5 (1.7 %) babies had born with neural tube defect and among fathers 149 (53%) maximum babies 41 (14%) circulatory system defect.

Conclusions: There is a need to make the rural women aware about hazardous effects of use of mishri through health education sessions to wean them out of this addiction, which is passed from one generation to the next as a tradition at an early age.

Keywords: Maternal, Risk factors, Tobacco use, Congenital anomalies

INTRODUCTION

According to WHO, nearly six million people die due to tobacco use per year in that five million deaths are the result of direct tobacco use and more than 600,000 are the result of non-smokers being exposed to second-hand smoke.¹ In India, as per global adult tobacco survey India (GATS) estimated number of tobacco users being 274.9 million where 163.7 million users of only smokeless tobacco, 68.9 million only smokers and 42.3 million users of both smoking and smokeless tobacco. It means around 35% of adults (47.9% males and 20.3% females)

in India use tobacco in some form or the other. Use of smokeless tobacco is more prevalent in India (21%).² adverse effect of tobacco on human physiology is well documented. The effect of tobacco on growing fetus when pregnant mother is exposed to tobacco is matter of concern as it effect fetus in various ways and also leading cause for congenital malformations. This is true for the passive or second hand exposure to tobacco also.

Many etiological factors contribute for the malformation and these are either genetic or non-genetic (environmental) and sometime combined. Non genetic causes are

exposure to any teratogenic substance or toxic including harmful drugs, organic chemicals, nutritional deficiencies and radiations. The exact relation between birth defect and tobacco use is not clearly understood, although hypotheses states that nicotine has direct effect on blood vessel. Nicotine causes vasoconstriction which leads to decreased blood supply to placenta is major reason for birth defect.³ Other reason may be, carbon monoxide combines with hemoglobin and reduces the placental oxygen availability. Another reason of tobacco use is, it increases the rupture of capillaries from neo-vascularization of placenta leading to hypoxia to the fetus which results in abnormal fetal morphogenesis.⁴

Over a period of decades non genetic causes are controlled and mortality and morbidity is considerable reduced due to malformation.^{5,6} Although 50% of causes for malformation are unknown origin, but, with primary prevention 50% of birth defects could be prevented. Research for finding the risk factors are continuous and such results would help to implement preventive strategies to improve maternal and child health.

METHODS

Present descriptive, cross sectional; hospital based study was conducted in Krishna Hospital Karad, which provides specialist's tertiary care services to patients largely belonging to lower/middle socio-economic strata of the society with both rural and urban background. The study included all the pregnant mother diagnosed to have congenital birth defected fetus through antenatal examinations, delivered baby with diagnoses of congenital malformation, who were admitted at tertiary care hospital Karad or came for reference services between September 2016 to august 2017. The study was initiated after approval of the institutional ethics

committee of Krishna Institute of Medical Sciences Deemed University's. Maternal and paternal data was collected to evaluate the relation between parental tobacco use and congenital malformations.

RESULTS

Prevalence of congenital malformation

Data was collected from pediatric and maternity unit. Total 75136 babies visited to pediatric outpatient department, 4092 kids admitted at pediatric ward and 774 neonates identified in neonatal intensive care unit as congenital malformations. Prevalence is being maximum in the neonatal intensive care unit 41 (5.3%), followed by pediatric ward 14 (0.3%) and pediatric outpatient department 45 (1%). 50856 patients were visited to maternity outpatient department in that 131 patients had the diagnosis of having congenital malformation fetus contributing to 0.3% of prevalence. Whereas maternity ward had 3847 admission among those 52 (1.4%) had delivered congenital malformed babies. Total 283 cases were diagnosed with birth defects.

Table 1: Prevalence of tobacco use among mothers of malformed babies.

Use of tobacco	Maternal	
	Frequency (F)	Percentage (%)
No	267	94.3
Yes	16	5.7
Total	283	100

Total 283 malformation cases were identified. Parent's history for tobacco use states that 16 (5.7%) mothers and 149 (53%) of fathers of malformed babies used tobacco.

Table 2: System wise classification of congenital malformation according to tobacco use.

ICD code	System of congenital malformation	Maternal tobacco use				Total malformations
		No	%	Yes	%	
Q00-Q07	Nervous system	58	20.5	5	1.8	63
Q10-Q18	Eye, ear, face and neck	2	0.7	0	0.0	2
Q20-Q28	Circulatory system	54	19.1	3	1.1	57
Q30-Q34	Respiratory system	5	1.8	0	0.0	5
Q35-Q37	Cleft lip and cleft palate	29	10.2	0	0.0	29
Q38-Q45	Digestive system	22	7.8	1	0.4	23
Q50-Q56	Genital organs	19	6.7	0	0.0	19
Q60-Q64	Urinary system	21	7.4	0	0.0	21
Q65-Q79	Musculoskeletal system	44	15.5	3	1.1	47
Q80-Q89	Other congenital malformations	2	0.7	0	0.0	2
Q90-Q99	Chromosomal abnormalities	11	3.9	4	1.4	15
Total		267	94.3	16	5.7	283

System wise distribution of congenital malformation

Distribution of congenital malformation according to international classification of disease (ICD-10) carries

out after collecting data which shows, maximum congenital malformations of nervous system 63 (22%), followed by circulatory system 57 (20%) and deformations of the musculoskeletal system 47 (17%).

Other deformities includes cleft lip and cleft palate 29 (10%), malformations of the digestive system 23 (8%), malformations of genital organs 19 (7%), malformations of the urinary system 21 (7%), other congenital malformations 2 (1%), chromosomal abnormalities, not elsewhere classified 15 (5%) malformations of the respiratory system 5 (2%) and congenital malformations of eye, ear, face and neck 2 (1%).

Number of congenital malformation with use of tobacco

Table 2 explains congenital malformation and history of use of tobacco. 267 (94%) mothers stated no history of using tobacco and only 16 (6%) mother's found using tobacco during and before their pregnancy. Among these 16 (5%) tobacco user mothers, 5 (1.7 %) babies had born with neural tube defect, 3 (1%) babies with circulatory system and musculoskeletal system defects and 1 (0.3%) with digestive deformities.

As per fathers' tobacco use concern, 149 (53%) fathers of malformed babies gave history of tobacco use. Among tobacco user, maximum babies 41 (14%) circulatory system defects, 25 (10%) musculoskeletal system, 24 (9%) nervous system malformations, 14 (5%) urinary system, 12 (4%) cleft lip and cleft palate and chromosomal abnormalities, 11 (3.9%) genital organs, 9 (3%) digestive system and only 1 baby diagnosed with respiratory defect.

DISCUSSION

In our study 283 congenital malformation were identifies. Among these, 267 (94%) mothers stated no history of using tobacco and only 16 (6%) mother's found using tobacco during and before their pregnancy. This pattern indicates that very few (6%) mother were at risk due to tobacco use. Malformations other than tobacco use are major risk in our study, but, the babies born to tobacco used mother must not be neglected in concluding the effect of tobacco on birth defect.

In India, per capita smokeless tobacco consumption has increased among the poor population between 1961 and 2000 in both rural and urban areas and both in males and females.⁷ In India, the use of smokeless tobacco is common in various forms like chewed, sucked or applied to teeth and gums.⁸ Maximum samples responded that they use chewable or applied form of tobacco. These kinds of smokeless tobacco products contain large amount of sodium (sodium bicarbonate) which is necessary to facilitate nicotine absorption.⁹ The effect of sodium bicarbonate is not well understood but the effect of nicotine on malformation is well documented. Parents also reported that they use the powdered form of tobacco called a 'mishri', prepared by roasting tobacco leaves, and principal constituent being alkaloid nicotine in 1 to 7%.¹⁰ The prevalence of tobacco use in this region is 17–45%.¹⁰

Despite these methodological differences, the association of tobacco use during pregnancy and malformation is well cited by many authors such as Bird, Bracken, Cedergren, Christensen, De Roo, Dickinson, Feldkamp, Ramirez, and Williams.¹¹⁻¹⁹ The results of these research were similar in regards to the association between maternal smoking during pregnancy and defects of the cardiovascular, respiratory, digestive, nervous, urogenital and musculoskeletal systems.

CONCLUSION

There is a need to make the rural women aware about hazardous effects of use of mishri through health education sessions to wean them out of this addiction, which is passed from one generation to the next as a tradition at an early age.²⁰

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REFERENCES

1. WHO. Tobacco, 2018. Available at: <http://who.int/mediacentre/factsheets/fs339/en/>. Accessed on 18 January 2019.
2. GATS India Report 2009-2010. Available at: <http://mohfw.nic.in/WriteReadData/1892s/1455618937GATS%20India.pdf>. Accessed on 18 January 2019.
3. Leopércio W, Gigliotti A. Tabagismo e suas peculiaridades durante a gestação: uma revisão crítica. *J Bras Pneumol*. 2004;30:176-85.
4. Quinton AE, Cook CM, Peek MJ. The relationship between cigarette smoking, endothelial function and intrauterine growth restriction in human pregnancy. *BJOG*. 2008;115:780-4.
5. Horovitz DDG, Llerena Jr. JC, Mattos RA. Atenção aos defeitos congênitos no Brasil: panorama atual. *Cad Saúde Pública*. 2005;21:1055-64.
6. Neto PS, Zhang L, Nicoletti D, Munchen FB. Mortalidade infantil por malformações congênitas no Brasil. *Rev AMRIGS*. 2012;56:129-32.
7. Consumption of Some Important Commodities in India 1999-2000. National Sample Survey Organization. NSS Report Nos. 184 and 461 (55/1.0/4). Reports covering 1961- 62 and 1999-2000.
8. Bhonsle RB, Murti PR., Gupta PC. Tobacco habits in India. In Gupta PC. Hamner JE III, Murti PR editors. *Control of Tobacco-Related cancers and other Diseases, Proceedings of an International Symposium, TIFR. Bombay, January 15-19, 1990*. Bombay: Oxford University Press; 1992: 25-46.
9. Benowitz NL. Sodium intake from smokeless tobacco. *N Engl J Med*. 1988;319:873-4.

10. Pratinidhi A, Gandham S. Use of Mishri a smokeless form of tobacco during pregnancy and its outcome. *Indian J Community Med*. 2010;35:15-8.
11. Bird TM, Robbins JM, Druschel C, Cleves MA, Yang S, Hobbs CA. Demographic and environmental risk factors for gastroschisis and omphalocele in the National Birth Defects Prevention Study. *J Pediatr Surg*. 2009;44:1546-51.
12. Bracken MB, Holford TR, White C, Kelsey JL. Role of oral contraception in congenital malformations of offspring. *Int J Epidemiol*. 1978;7:309-17.
13. Cedergren MI, Selbing AJ, Källén BAJ. Risk factors for cardiovascular malformation-a study based on prospectively collected data. *Scan J Work Environ Health*. 2002;28:12-7.
14. Christensen K, Olsen J, Norgaard-Pedersen B, Basso O, Stoving H, Milhollin-Johnson L, et al. Oral clefts, transforming growth factor alpha gene variants, and maternal smoking: a population-based case-control study in Denmark, 1991-1994. *Am J Epidemiol*. 1999;149:248-55.
15. DeRoo LA, Gaudino JA, Edmonds LD. Orofacial cleft malformations: associations with maternal and infant characteristics in Washington state. *Birth Defects Res A Clin Mol Teratol*. 2003;67:637-42.
16. Dickinson KC, Meyer RE, Kotch J. Maternal smoking and the risk for clubfoot in infants. *Birth Defects Res A Clin Mol Teratol*. 2008;82:86-91.
17. Feldkamp ML, Alder SC, Carey JC. A case control population-based study investigating smoking as a risk factor for gastroschisis in Utah, 1997-2005. *Birth Defects Res A Clin Mol Teratol*. 2008;82:768-75.
18. Ramirez D, Lammer EJ, Iovannisci DM, Laurent C, Finnell RH, Shaw GM. Maternal smoking during early pregnancy, GSTP1 and EPHX1 variants, and risk of isolated orofacial clefts. *Cleft Palate Craniofac J*. 2007;44:366-73.
19. Williams LJ, Correa A, Rasmussen S. Maternal lifestyle factors and risk for ventricular septal defects. *Birth Defects Res A Clin Mol Teratol*. 2004;70:59-64.
20. Gupta PC, Hamner JE, Murti PR. Control of Tobacco Related Cancer and other Diseases. 1st edition. Oxford University Press; 199: 327.

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