ORIGINAL RESEARCH PAPER

Microbiology

BLOOD AND INK: TIME TO THINK?

KEY WORDS:

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ABSTRACT

BACKGROUND: Getting inked or tattooed is a recent trend in the youth of India. Tattooing is done in India both in professional and non-professional setup using both manual and electronic machines. These young tattooed individuals form part of the blood donor pool. This study was done to detect any difference among tattooed and non-tattooed blood donors regarding their TTI status and to find any relation between sizes, location, and source of tattoo with respect to the TTI status.

METHODS: 70 tattooed blood donors presenting in Department of Transfusion Medicine, Christian Medical College, Ludhiana who fulfilled the criteria for blood donation were compared for TTI with 70 non tattooed individuals matched for age, gender using Enhanced Chemiluminescence (VITROS ECiQ, Ortho Clinical Diagnostics) and ID NAT (Procleix Ultrio Plus, Hemogenomics) from 1st January, 2016 to 15th April, 2016.. The tattooed group was analysed with respect to TTI reactivity and the following variables; size of tattoo, location of tattoo, made by professional or non-professional tattoo artist, usage of disposable new needle or new dye, using a structured questionnaire.

RESULTS : Amongst 70 pairs of age, gender and place of donation matched healthy blood donors, 17.1 % (12) of tattooed individuals were positive for TTI as compared to the 4.2% (3) of non-tattooed individuals. This difference was found to be statistically significant (p= 0.026) with an associated relative risk = 4.00 (95% CI= 1.179 to 13.566). Amongst the tattooed cohort, 7.2% (4) individuals who got the tattoo from a professional tattoo artist developed TTI, as compared to 53.3 % (8) individuals who went to non-professional tattoo artists. The difference was statistically highly significant (p=0.000). The nature of instrument showed a statistically significant difference (p= 0.002) with 12.3 % (8) individuals who got it made through electronic machine developing TTI as compared to 80% (4) who got it done using manual method. The relation between new and disposable needle along with new dye could not be studied as majority of tattooed donors could not recall accurately. The relation between size and location of tattoo demonstrated no significant relation with development of TTI.

SUMMARY /CONCLUSIONS: Getting a tattoo showed a statistically significant relation with developing a TTI in an age, gender and place of donation matched cohort. Amongst the tattooed individuals, getting tattoo from a non-professional artist and using a manual method of tattooing demonstrated a statistically significant relation with developing TTI. Further studies using a much larger sample size is needed to formulate a policy at a national level.

BACKGROUND

Getting inked or tattooed is a recent trend in the youth of India. Although the practice is also seen in ancient India, the recent surge of getting inked is due to the increased enthusiasm toward newer fashion trends (Shashikumar *et al.*, 2017). Tattoo is done in India both in professional and non-professional setup using both manual and electronic machines. However, there is lack of proper knowledge both among "Tattoo Artists" and the persons receiving them, about hygienic practices and health risks associated with it. These young tattooed individuals form part of the blood donor pool. In accordance with the Government of India Guidelines (National Blood Transfusion Council, 2017), our institutional deferral period is 1 year after getting a tattoo. The donated blood is tested for Transfusion Transmitted Infections (TTI) like Human immunodeficiency virus (HIV), Hepatitis B Virus, Hepatitis C Virus, Syphilis and Malaria as per the Drugs and Cosmetics Act 1940 (Ministry Of Health And Family Welfare , 2003).

AIMS

This study was done to detect any difference among tattooed and non-tattooed blood donors regarding their TTI status and to find any relation between sizes, location, and source of tattoo with respect to the TTI status.

METHODS

70 tattooed blood donors presenting in Department Of Transfusion Medicine, Christian Medical College and Hospital, Ludhiana who fulfilled the criteria for blood donation were compared for TTI with 70 non tattooed individuals matched for age, gender and place of donation using Enhanced Chemiluminescence (VITROS ECiQ, Ortho Clinical Diagnostics) and ID NAT (Procleix Ultrio Plus, Hemoge n omics) from 1st January, 2016 to 15th April, 2016.

The tattooed group was analysed with respect to TTI reactivity and the following variables; size of tattoo, location of tattoo, made by professional or non-professional tattoo artist, usage of disposable new needle or new dye, using a structured questionnaire.

RESULTS

Amongst 70 pairs of age, gender and place of donation matched healthy blood donors, 17.1 % (12) of tattooed individuals were positive for TTI as compared to the 4.2% (3) of non-tattooed individuals. This difference was found to be statistically significant (p= 0.026) with an associated relative risk = 4.00 (95% CI= 1.179 to 13.566). (Table 1)

Amongst the tattooed cohort, 7.2% (4) individuals who got the tattoo from a professional tattoo artist developed TTI, as compared to 53.3 % (8) individuals who went to non-professional tattoo artists. The difference was statistically highly significant (p=0.000). The nature of instrument showed a statistically significant difference (p= 0.002) with 12.3 % (8) individuals who got it made through electronic machine

developing TTI as compared to 80% (4) who got it done using manual method. The relation between new and disposable needle along with new dye could not be studied as majority of tattooed donors could not recall accurately. The relation between size and location of tattoo demonstrated no significant relation with development of TTI. (Table 2)

SUMMARY /CONCLUSIONS/DISCUSSION

Getting a tattoo showed a statistically significant relation with developing a TTI in an age, gender and place of donation matched cohort. It has already been well established as a risk factor for transmission of Hepatitis B virus infection (Jafari *et al.*, 2012), Hepatitis C virus infection (Jafari *et al.*, 2010; Tohme and Holmberg, 2012), Syphilis (Nishioka and Gyorkos, 2001) and has been suggested for Human Immunodeficiency Virus infections (Doll, 1988) .

An ANOVA test showed that the tattooed cohort has a significantly higher incidence of infection than various studies done in the country. (p-value=0.04) (Table 3)

Amongst 70 pairs of age, gender and place of donation matched healthy blood donors, significantly higher number of tattooed individuals were positive for TTI as compared to the non-tattooed individuals, with HCV being the most predominant infection (58.33%) in the tattooed group. This was similar to the Taiwanese case-control study of tattooing and HCV infection (Sun *et al.*, 1999) which showed that the odds ratio of Tattooing in Relation to Hepatitis C Virus Infection was 3.1 (95% CI: 0.7-13.3). Similar results were also seen by another study (De A. Nishioka *et al.*, 2002) where the odds ratio of developing at least one TTI and tattoo was 3.25 (95% CI: 1.70-6.41).

Amongst the tattooed cohort, 7.2% (4) individuals who got the tattoo from a professional tattoo artist developed TTI, as compared to 53.3 % (8) individuals who went to non-professional tattoo artists. The difference was statistically highly significant (p=0.000). The Taiwanese study (Sun *et al.*, 1999) also found that the prevalence of HCV infection was higher among individuals who had non-professionally made as opposed to professionally-made tattoos.

The nature of instrument showed a statistically significant difference (p= 0.002) with 12.3 % (8) individuals who got it made through electronic machine developing TTI as compared to 80% (4) who got it done using manual method. This can be attributed to the lack of sense of sterility often found in manual method users which are predominantly non-professional tattoo artists.

The relation between new and disposable needle along with new dye could not be studied as majority of tattooed donors could not recall accurately.

The relation between size and location of tattoo demonstrated no significant relation with development of TTI. This is contrast to the association that was found in their study, (Nishioka, S. D. A, 2002) which they attributed to chance due to other variables like incarceration, drug addiction which may be associated with a specific site of tattoo. The present authors are of the opinion that since other confounding factors were removed during medical screening of blood donors their influence on the study was not seen.

With the limitation of the small study population, the authors are of the opinion that much larger studies are required in future to assess the correlation of tattoo and TTI in blood donors. There is also a need to revisit the blood donation criteria for tattooed donors.

Table 1 Relation between getting a tattoo with developing a TTI in an age, gender and place of donation matched cohort

	TTI Positive	TTI Negative	Total	P – value	Relative risk
Tattooed	12 (17.1%)	58 (82.9%)	70	0.026 (χ2 Test) *	4.00 (95% CI= 1.18 - 13.57) *
Non-Tattooed	3 (4.3%)	67 (95.7%)	70		
* Graphpad Instat Demo, Graphpad Software Inc, San Diego, USA					

Table 2 Relation Between Tattoo Characteristics and TTI Reactivity

		TTI Pos	TTI Neg	P value
Size	<1	2	11	0.9825
	1-3	6	28	
	>3	4	19	
Location	1 Chest	0	6	0.2466
	2 Forearm	5	19	
	3 Back	2	5	
	4 Leg	0	8	
	5 Face	1	2	
	6 Neck	0	9	
	7 Deltoid	4	9	
Done By	Prof	4	51	<0.0001
	Non-Prof	8	7	
	Can't Say	0	0	
Instrument	Electronic	8	57	0.0001
	Manual	4	1	
	Can't Say	0	0	
Disposable Needle	Yes	2	44	Not analysed as majority could not recall
	No	1	0	
	Can't Say	9	14	
New Needle	Yes	3	46	Not analysed as majority could not recall
	No	1	0	
	Can't Say	8	12	
New Dye	Yes	3	23	Not analysed as majority could not recall
	No	0	0	
	Can't Say	9	35	
Body Piercings	Yes	9	35	0.3389
	No	3	23	
Done By	Professional Artist	4	51	<0.0001
	Non-Professional Artist	8	7	
	Electronic Instrument	8	57	0.0001
	Manual Instrument	4	1	

Table 3 Incidence of transfusion transmitted infections in blood donors

	HIV (%)	HCV (%)	HBV (%)
Tattooed cohort (present study)	1.43	12.86	5.71
Pahuja S et al, 2007	0.56	0.66	2.23
Arora D et al, 2010	0.30	1.00	1.70
Chandra T et al, 2009	0.23	0.85	1.96
Srikrishna A et al, 1999	0.44	1.02	1.86
Giri PA et al, 2012	0.07	0.74	1.09
Bhattacharya P et al, 2007	0.28	0.31	1.46
Makroo RN et al, 2015	0.24	0.43	1.18

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