THE EFFECT OF TIME ON BLOOD TYPES OF ABO SYSTEMS ON SALIVA SPOTS OF CIGARETTE BUTTS FOR FORENSIC IDENTIFICATION

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ABSTRACT

The identification process is not only carried out on the body of a victim of a crime, but can also be carried out on the evidence evidence found at the crime scene. The timing of a crime case and the time interval for collecting evidence of a crime is an obstacle in the process of identifying blood saliva on cigarette butts. Saliva will dry within an hour and forty minutes at room temperature, and with the influence of various other factors saliva will dry in less than three hours. The purpose of this study was to determine the effect of the duration of temperature exposure on the protein levels of cigarette saliva in order to help the identification process of forensic blood groups. The time series design was used in this study in which 18 filter cigarette butts were collected from 6 individuals who were subjected to research with blood types A, B and AB then incubated 1.3 and 6 hours. Examination of protein content was carried out using trizol reagent with UV spectrophotometer reading. Data were processed using non-parametric T-test statistics. There was a decrease in salivary levels in a predetermined time of 1, 3 and 6 hours. Cigarette butt saliva protein levels can still be detected within 1, 3 and 6 hours so that they can be used to help identify the forensic blood group from cigarette butt saliva.

***Keywords**: Cigarette butts; saliva; protein; forensic identification*

ABSTRAK

Proses identifikasi tidak hanya dilakukan pada tubuh korban suatu tindak pidana, tetapi juga dapat dilakukan pada alat bukti petunjuk yang telah ditemukan pada TKP. Waktu peristiwa suatu perkara kejahatan dan selang waktu pengumpulan alat bukti petunjuk suatu tindak kejahatan merupakan suatu kendala dalam proses identifikasi golongan darah saliva pada puntung rokok. Saliva akan mengering dalam kurun waktu satu jam empat puluh menit dalam suhu kamar, dan dengan pengaruh berbagai faktor lain saliva akan mengering dalam waktu kurang dari tiga jam. Tujuan dari penelitian ini untuk mengetahui pengaruh lama paparan suhu terhadap kadar protein saliva rokok guna membantu proses identifikasi golongan darah forensik. Desain time series digunakan dalam penelitian ini dimana 18 puntung rokok filter dikumpulkan dari 6 individu yang dijadikan obyek penelitian dengan golongan darah A, B dan AB kemudian diinkubasi 1,3 dan 6 jam. Pemeriksaan kadar protein dilakukan mengunakan reagent trizol dengan pembacaan spektrofotometer UV. Data diolah mengunakan statistik non parametrik uji T.Terjadi penurunan kadar saliva dalam waktu yang telah ditentukan 1, 3 dan 6 jam. Kadar protein saliva puntung rokok masih dapat terdeteksi dalam kurun waktu 1 , 3 dan 6 jam sehingga dapat digunakan dalam membantu proses identifikasi golongan darah forensik dari saliva puntung rokok.

***Kata kunci**: Puntung rokok; saliva; protein; identifikasi forensik*

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INTRODUCTION

Forensic identification is an attempt by investigator to reveal the identity of a victim of a crime or the perpetrator of a crime. The identification process is not only carried out on the body of a victim of a crime, but can also be carried out on the evidence evidence that has been found at the crime scene (Gani 2002). A study in Bangkingan area, Madura, East Java showed the habit of smoking patterns, what brands are consumed, lip prints, fingerprints, even the rest of saliva is also found on cigarette butts (Hardjanto 2015). The remaining saliva left in cigarette butt can be used as a blood type examination specimen which is a secondary identification component (Rogers & Newton 2005). The glycoprotein content in saliva is a determining component of blood type ABO and Lewis (Le) in individuals who have the type of secretor blood type (Albertolle et al 2015). According to the police medical laboratory research in Jakarta, police officers studied

75% secretor blood group, whereas from the population data 85% of the world's people were non secretor blood groups.

The timing of a crime case and the time interval for collecting evidence of a crime is an obstacle in the identification of salivary blood groups. Saliva will dry within an hour and forty minutes at room temperature and with the influence of various other factors saliva will dry in less than three hours (Jellinghaus et al 2015). In order to assist in the process of identifying a criminal case by means of evidence in the form of cigarette butts, it is necessary to determine the initial identification of blood type using a saliva examination to help determine the identity of the victim and suspect so that it can help narrow the possibility of the identity of the victim and suspect. This study aimed to determine how much time can still be used to detect salivary blood group examination based on the remaining protein content.

MATERIALS AND METHODS

This was an experimental laboratory study using time design, ie after 1, 3 and 6 hours at room temperature. The research sample used in this study was as many as 18 cigarette butts. In this study, the independent variables used were saliva on cigarette butts, while the dependent variable in the study was identification of forensic blood groups. The control variable in this study was the length of time used by researchers, which ranged from 1 hour, 3 hours and 6 hours to determine whether there was a decrease in protein in saliva. Whereas, the disturbing variable in this study was the temperature because it can lead to drying of saliva on cigarette butts. This research was carried out at the TDC Laboratory (Tropical Disease Center), Institute of Tropical Disease Center, campus C, Universitas Airlangga, Surabaya, and the forensic laboratory of Saiful Anwar Hospital, Malang. Non parametric statistical tests (normality, homogeneity, t test) with linear regression analysis were used to determine the relationship of the effect of temperature exposure time with the amount of protein content in saliva cigarette butts. Data were analyzed using descriptive analysis.

RESULTS

Samples were obtained from six cigarette butts sucked by six individual research subjects whose blood type was known. Cigarette butts with number 1 (A1 - F1) were swabed at 1 o'clock after sucking, cigarette butts with number 2 (A2 - F2) were swabed at 3 o'clock after sucking, and cigarette butts with number 3 (A3 - F3) wee swab at 6 o'clock after sucking. In reading the protein content of cigarette butt saliva with Spectrophotometry using a wavelength of 280 nm, we obtained 280/260 absorption ratio to determine the correction factor in a table. Protein levels are determined by the formula: protein content (mg/ml) = A280 x correction factor x dilution.

Table 1. Mean protein content

No	Room temperature exposure time	Mean protein content (mg/ml)
1	1 hour	1.43
2	3 hours	1.49
4	6 hours	1.86

DISCUSSION

From the results of protein content, statistical analysis was carried out. The protein content data for each group of exposure time had normal distribution with a significance value of >0.05. In the comparative test using paired T test, a comparison between 1 hour and 3 hours was carried out again compared between 3 hours and 6 hours and finally between 1 hour and 1 hour in which from the three comparisons of time significant values of ≤0.05 or each - for 0.020 for 1 hour: 3 hours, 0.014 for 3 hours: 6 hours and 0.002 for 1 hour: 6 hours were obtained, which means that overall, there were significant differences in protein levels in each time group. There were quite striking differences at 1 hour post incubation with 6 hours post incubation. This means that there was a significant correlation between the duration of room temperature exposure and salivary protein levels. Correlation value of -0.87 was obtained, which means that the longer the exposure to room temperature, the higher the value of salivary protein levels, with a high degree of stiffness.

In the agglutination examination of blood type inhibition absorption method, a positive agglutination value on the control was obtained, namely on the antisera titration 1:16. At 1 hour, a positive agglutination value on antisera 1:4 titration was obtained at 100% sample. At 3 hours, a positive agglutination value of 1:4 antisera titration was obtained at 100% of the sample and at 1:8 titration of 50%. Furthermore, at 6 hours the results showed positive agglutination value on antisera titration 1:4 by 100% of the sample and on antisera titration 1:8 by 50%.

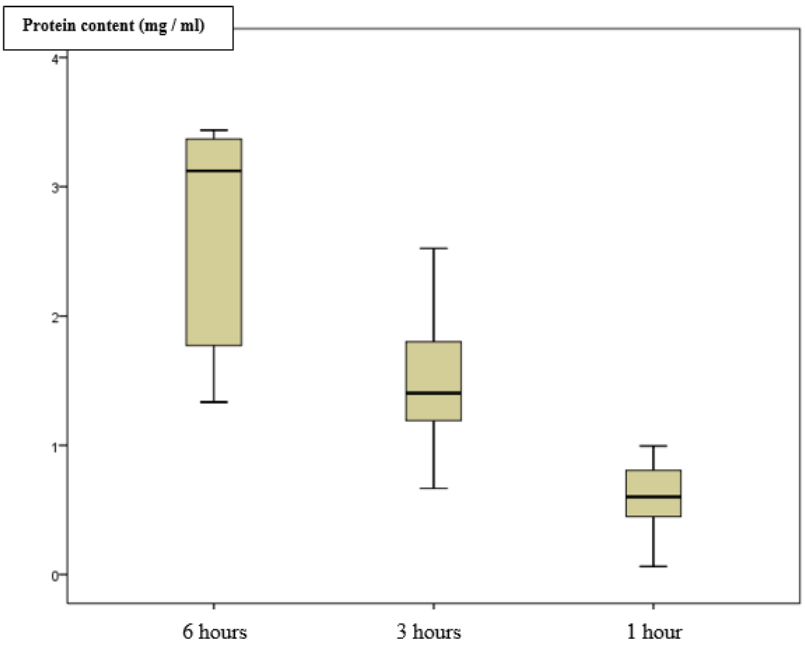

Fig. 1. Mean protein content; room temperature exposure time.

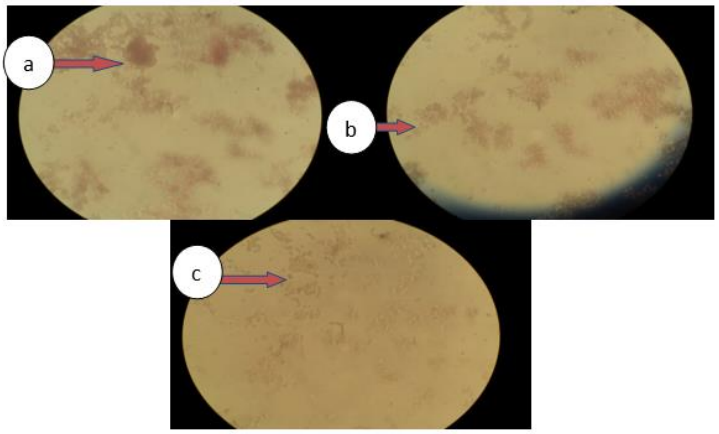

Fig. 2. Microscopic agglutination of cigarette butts: a (3 +), b (2 +), c (+/-).

When compared with the value of agglutination in the control, all saliva samples on cigarette butts showed the presence of ABO blood group antigens in saliva. This means that up to 6 hours of room temperature exposure, ABO blood group antigen carrier proteins in saliva were still present and not completely denatured.

The foregoing means, in saliva 1 hour to 6 hours after incubation on cigarette butts, 100% can be examined by blood type with the absorption inhibition method. Protein denaturation occurs with one of the factors, namely drying or reducing water content in the carrier material. In saliva, denaturation of ABO blood group antigen carrying proteins can occur if saliva is drained. In studies in Germany, saliva will experience complete drying on the rock at room temperature, within 1 hour 40 minutes.

CONCLUSION

The duration of exposure to room temperature has been shown to affect protein levels in cigarette butt saliva, a statistically significant value of 0.012<0.05, which

means that there was significant difference between room temperature exposure and salivary cigarette protein content. Correlation value of -0.87 was obtained, which means that the longer the room temperature exposure, the higher the value of saliva cigarette butt protein content with high influence strength values. In the swab of 1 hour after incubation, a positive agglutination value was obtained on the antisera 1:4 titration of 100% of the sample. At 3 hours after incubation, a positive agglutination value of 1:4 antisera was obtained at 100% of the sample, and at antisera 1:8 titration at 50% of the sample. At 6 hours post incubation, it was found that the positive agglutination value on antisera titration 1: 4 was 50% and the antisera titration 1:8 was 50%. The description showed that the activity of ABO antigen carrier protein in saliva had decreased in the duration of room temperature exposure at 3 and 6 hours.

REFERENCES

Albertolle ME, Hassis ME, Ng CJ, Cuison S, Williams K, Prakobphol A, Sykstra AB, Hall SC, Niles RK, Witkowska HE, Fisher SJ (2015). Mass spectrometry-based analyses showing the effects of secretor and blood group status on salivary N-glycosylation. Clin Proteomics 12, 29

Gani (2002). Ilmu kedokteran forensik. Padang, Faculty of Medicine, Universitas Andalas

Hardjanto P (2015). TKP bicara. Surabaya, PT. Refka Petra Media

Jellinghaus K, Blasser L, Scheller C Bohnert M. Drying time for Human Saliva (2015). Arch Criminal Mart-Apr 235, 99-109. Available from https://www.ncbi. nlm.nih.gof/pubmed/26419084. diakses februari 2017.

Rogers D, Newton M (2005). Sexual assault examination. Clinical forensic medicine a physician's guide. 2nd ed. New Jersey, Human press Inc