Pattern of Maternal Serum Alpha-Foetoprotein Immediately Post Partum in Sokoto State, Nigeria

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ABSTRACT

Numerous studies have reported the reference range of maternal serum alpha-foetoprotein immediately postpartum, which could help in screening, diagnosis and monitoring of intrauterine anomaly during pregnancy. However such studies are lacking in Sokoto metropolis. The objective of this study is to determine the reference range of maternal serum alpha-fetoprotein (MSAFP) immediately post partum and its association to parity, body mass index (BMI) and 1-minute Apgar score of the babies. A cross-sectional descriptive study was conducted in some selected hospitals in Sokoto metropolis, between March and November 2012. Using semi-structured questionnaire, data on Parity of mothers and 1-minute Apgar score are collected. Four millilitres of peripheral blood are collected immediately post delivery of placenta to determine the MSAFP using Enzyme linked Immunosorbent assay (ELISA) Method. The data was processed using analyse it 221t, the Pd" 0.05 is considered statistically significant. The MSAPF values are analysed using descriptive statistics. The association between the variables is analysed using Pearson/spearman correlation. The mean and standard deviation of MSAFP iss found to be 150.03 ± 50.65ng/ml. The reference range MAFP is found to be 51 to 294ng/ml. A significant negative correlation between MSAFP and respective BMI, as well as 1-minute Apgar score of corresponding babies is observed. However no association is observed between the MSAFP and respective parity of the mother. This study reported the mean and preliminary reference range of MSAFP distribution in population of Sokoto State, Nigeria. This could be of help in the screening, diagnosis and monitoring of maternal/neonatal diseases during pregnancy.

Keywords: *Serum alpha-fetoprotein, Reference range, Mother, Sokoto*

INTRODUCTION

Alpha-foetoprotein (AFP) also known as alpha-1-foetoprotein or alpha-foetoglobin is a glycoprotein made up of a single polypeptide chain. Its molecular weight is about 75 kilo Delton. AFP is first synthesized by yolk sac of the developing embryo. The foetal liver begins to synthesize it from sixth weeks of gestation onward and reaches the highest peak in foetal plasma at about 13 weeks. It falls progressively from then until term (Bolarin, 2013). The AFP level is very low at birth and is absent or undetectable in the plasma at

about two weeks postpartum, serum AFP as biochemical marker is used in Obstetrics monitoring of physiological condition like multiple gestation, screening of foetal anomaly intrauterine, like neural tube defects, Down's syndrome. However, if AFP resurfaces after disappearance from plasma, it is considered as tumour marker (Bolarin, 2013). Alpha-foetoprotein (AFP) as tumour marker is defined as a biochemical substance, the concentration of which can be related to the presence or progress of a disease/tumour (Coombes, 1982). It has many characteristics which includes; being specific for a particular tumour/tissue; it is secreted into the body fluid; its concentration is proportional to the tumour/disease burdens, short half-life (approximately 5days), so that rapid changes reflect response to therapy. Has more than 80% sensitivity and specificity (Bucman, 1982; Beastall, Cook, Rustin and Jennings, 1991**)**. Hence, it is used for screening, monitoring and follow up for early reoccurrence (Beastall, Cook, Rustin and Jennings, 1991).

Normal pregnancy lasts approximately 40 weeks, as measured from the first day to the last normal menstrual period (commonly abbreviated as LNMP or LMP). The anticipated date of birth of an infant is commonly referred to as the expected date of confinement or EDC. During pregnancy, a woman undergoes dramatic physiological and hormonal changes. Physicians customarily divide pregnancy into three intervals called trimesters, which are each slightly longer than 13 weeks (Ashwood, 1992). By convention, the first trimester, 0 to 13 weeks, begins at the first day of last menses. Conception occurs at approximately day 14 in women with regular menstrual cycles (Ashwood, 1992).

Cherneckey and Berger (2008) report that the reference range Serum AFP of immediately postpartum mothers is 68 to 375ng/ml. A study done by Fotein *et al.* (2011) reports that Negative correlation between body mass index and respective MSAFP (Fotein *et al.*, 2011). A study done by Moacir, Surinder and Thomas, 1986 report the Mean and Standard deviation of MSAFP at term is 172 $\pm$ 97 ng/ml, also Observed a significant negative correlation between Apgarscore at 1-minute, body mass index and respective MSAFP, however no significant association was observed between Parity of mother and respective MSAFP (Moacir, Surinder and Thomas, 1986)

Though maternal serum alpha-fetoprotein level has been studied in various region of the world: Cherneckey and Berger (2008) in USA, Moacir, Surinder and Thomas (1986) in United Kingdom, there is paucity for information on this in Sokoto State, Nigeria. The purpose of this study is to define the reference range of maternal serum alpha-fetoprotein and relationship to its respective parity, body mass index and neonatal Apgar score at 1-minute in Sokoto metropolis.

MATERIALS AND METHOD

Sokoto State is located in the North Western part of Nigeria. Its geographical coordinates are 13p 3' 5" North, 5p 13' 53" East, the land area measures 28232.37 square kilometres and situated 900 metres above sea level (Tsoho 2010). A Cross-sectional descriptive study that was performed on apparently healthy full term pregnant women who delivered at department of Obstetrics and Gynaecology (labour room) of Maryam Abacha Women

and Children Hospital (MAWCH), Specialist Hospital, Sokoto (SHS) and Usmanu Danfodiyo University Teaching Hospital, Sokoto (UDUTH) between March and August 2012 in Sokoto Metropolis. The Subjects were selected consecutively, after a written/ verbal consent was obtained from the them. The study has received ethical approval from Local Ethical Committee. Mothers that were delivered through natural birth process (vaginally) at full term of pregnancy who signed consent form were included. Premature delivery, twin pregnancy and mothers delivered through caesarean section were excluded from the study. Gestational age was calculated using mother's Last Menstrual Period (LMP) by applying Nagele¼s rule and using foetal ultrasound done on/or before 20th weeks of gestation .The weight was measured using weighing balance (both digital and manual). The height was measured using Standiometre.

A semi structured questionnaire was formulated, and data were collected at labour room of the enrolled health institutions in Sokoto metropolis (UDUTH, MAWCH and SHS), the data collected include: gestational age of pregnancies, parity weight, height and 1-miunute Apgar score of neonates. Four millilitres of peripheral blood of mothers were collected after delivery of placenta. The samples were allowed to clot at 28ºC and were centrifuged at 3000rpm for 5 minutes, the clear unhaemolysed sera were separated from the clotted blood, sera were stored at -20ºC, which were later used to determine MSAFP, using semi-automated solid phase ELISA sandwich method (Using syntron kits procured from Monobind Inc. Diagnostic Ltd, 100 North Pointe Drive Lake Forest, CA 92630 USA. through the local agent based in Lagos AGGAPE Ltd (Afonja, 2010).

The dataset was stored in Microsoft office Excel for window 2007 spreadsheet, and was analyzed using micro excels analysit221t, Statistical computer software 2010 version P-values less than 0.05 (d" 0.05) were regarded as statistically significant. The serum alpha fetoprotein was analyzed using descriptive statistics. The association between body mass indexes (BMI), parity of mothers with respective maternal serum alpha-foeto protein was analyzed using Pearson moment correlation. The association between the neonatal Apgar score at 1-mintes and respective MSAFP was analysed using Spearman correlation.

RESULTS AND DISCUSSION

A total of 104 full term pregnant women were enrolled for the study and all the subjects were delivered through natural birth process (vaginally) at full term of pregnancy (37-40 weeks of gestation). The mean and standard deviation of MSAFP immediately post partum (n = 104) was found to be 150.03 ± 50.65ng/ml. The reference range MSAFP (n = 104) was found to be 51 to 294 ng/ml. Both BMI and1-minute Apgar score of neonates showed a significant negative correlation with respective MSAFP($r = 0.06$, $p = 0.0532$ and $r = 0.09$, $p = 0.0521$ respectively). However, no association was observed between the MSAFP and respective parity of mother ($r = 0.14$, $p = 0.1657$). Alpha-foetoprotein in maternal blood is regulated by various and complex mechanism. Basically, it depends on the rate of biosynthesis of the protein by foetal liver, its transference to maternal circulation

and the rate of catabolism. Any factor which acts on these mechanisms would certainly modify alpha-foetoprotein values in maternal blood. Hence, the present study investigates the relationship between MSAFP values and Parity, body mass index, and 1-minute Apgar score of neonates. In the hopes that some significant association would elucidate the possible role of those factors in controlling the levels of AFP. The mean and reference range of maternal serum alpha-foetoprotein of immediately post partum mothers (n = 104) who spontaneously delivered apparently healthy full-term singleton neonates were 150.03 ± 50.65ng/ml and 51 to 293ng/ml respectively. This is similar to the previous study done by some investigators who found out to be 50 to 375ng/ml (Chermeky and Berger, 2008).

A significant negative association found in this study, confirms the previous studies findings of correlation between high maternal serum alpha foetoprotein and foetal distress (Seppale and Ruoslath, 1973; Seller, Creasy and Alberm, 1974). Seeming that high levels of the AFP present in the blood of mothers who gave birth to babies with low Apgar score, this can also be interpreted as an altered foeto-maternal barrier, prejudicing well being of the foetus. Although this relationship must not be considered as proof for causal association, it may represent a potentially useful tool to the obstetrician and paediatrician in the management of complicated pregnancies and future neonates, also this could be useful in monitoring intrauterine growth restriction, foetal distress as well as death. In this study it was seen that the parity does not correlate with the concentration of maternal serum alpha-foetoproteins, therefore this result do not indicate a general immunosuppressive role of alpha foetoprotein in third trimester of pregnancy as postulated by other investigators **(**Murgita and Tomasi, 1975 and Lester, Miller, Baron and Yachnin, 1978).

Table 1: Relation between the parity and MSAFP value immediately post partum assessed in the present study.

Parity	MSAFP (ng/ml) immediately post partum (Mean + SD)
Para 1	148.42 ± 51.37 (n = 24)
Para 2 to 5	146.68 ± 51.73 (n = 60)
Para 6 and above	140.43 ± 43.96 (n = 20)
F-probability	0.144

No significant difference was observed between MSAFP immediately post partum and respective parity.

Source: A Cross-sectional descriptive study.

Table 2: Comparison of MSAFP value immediately post partum (mean±SD) whose babies had Apgar score equal to or above 8 and below 8 assessed in the present study

1-minute Apgar score (min)	MSAFP (ng/ml) immediately post partum (Mean + SD)
Equal/or above 8	148.38 ± 50.71 (n = 66)
Below 8	153.38 ± 50.69 (n = 38)
F-probability	0.004

Shows that high levels of MSAFP value are present in blood of mothers whose babies Apgar Scores are below 8.

Source: A Cross-sectional descriptive study.

CONCLUSION

This study was conducted to determine the reference range of maternal serum alpha-fetoprotein (MSAFP) immediately post partum and its association to parity, body mass index (BMI) and 1-minute Apgar score of the babies in Sokoto State, Nigeria. A cross-sectional descriptive study was conducted in some selected hospitals in Sokoto metropolis, between March and November 2012. This study reports the mean and preliminary reference range of serum alpha-fetoprotein distribution in immediately postpartum mothers of Sokoto, Nigeria. This could be of help in the screening and diagnosis of maternal disease in late pregnancy as well as intra-uterine foetal anomaly during pregnancy.

ACKNOWLEDGEMENTS

The authors thank the Management of Specialist Hospital Sokoto, Maryam Abacha Women and Children Hospital and Usmanu Danfodiyo University Teaching Hospital, Sokoto, particularly Dr. M. A. Attahiru, Dr. E. O. Nwobodo, Dr. Danjuma. Lawal, Dr. Abba Wali, Nurse Maryam Utteh, Mr. A. Adesoji, Bashar Sani, Abubakar Abdullah Ngaski for their various roles and cooperation in the collection of data and specimen for biochemical analysis.

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